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THESIS

ANALYZING THE ASSIGNMENT OF ENLISTED RECRUITING GOAL SHARES VIA THE NAVY'S ENLISTED GOALING AND FORECASTING MODEL

by

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   This thesis examines the process by which enlisted goal shares are generated by Commander, Navy Recruiting Command (CNRC) and assigned to Navy Regional recruiting commands. Through use of an econometric goaling and forecasting model employed by CNRC and a less complicated weighting system used by Regions, goal shares are generated using factors believed to accurately predict future recruiting success. The factors used in the new contract prediction model include local economic conditions, population demographics, and recruiting resources. This thesis evaluates these factors to obtain a clear understanding of how each affects the establishment of goal shares. The various levels within the recruiting organization are analyzed, to include a discussion on how each of these levels prioritizes assigned goals, specifically accessions and new contract objectives, and the reasons why these priorities differ across levels within the organization. The thesis analyzes the role of past production data and Production per Recruiter (PPR) in establishing goal. Recruiter incentives and potential impacts of these incentives on the attainment of quality contracts are also discussed. Finally, the accuracy of CNRC forecasts is evaluated and recommendations are made to help ensure the continued success of these forecasts well into the future. This thesis finds CNRC's goaling forecasts to be quite accurate; however, with more precise data for a few specific variables within the goaling model, it is believed the accuracy of forecasts could be improved. Additionally, this thesis finds that due to current recruiter incentives, recruiters may not be motivated to contract the best possible candidates for enlistment at all times.

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I.   INTRODUCTION

A.   BACKGROUND

Many have described recruiting for the armed services as a "war for people." It is a battle to attract the best and brightest of our country's youth to support and defend this great nation. A battle, which is as tough today as it has ever been and which this toughness is matched only by its importance. For the Navy, this need for people has become even more critical as continuing technological advances have led to an ever-increasing need for more dedicated, dependable and intellectually-capable recruits.

A significant reduction in the size of the naval force over the past decade has resulted in drastically reduced accession requirements. These reductions coupled with an increasing population, might make it seem unlikely that the Navy would have difficulties in attracting the right recruits. In order to understand these difficulties, we must first understand the competing forces the Navy faces when attempting to recruit young men and women. As with all generations of youth, factors such as economic conditions, family relationships and societal views have a great impact on the way today's youth view military service and, thus, their propensity to join.

Understanding that there are a significant number of factors which affect a potential recruit's decision to join the Navy, Commander Navy Recruiting Command (CNRC) is nonetheless charged with locating, attracting, contracting and accessing a very precise number of recruits each year. In doing so, CNRC must ensure these recruits meet minimum eligibility requirements for naval service. Additionally, if this wasn't enough, it is highly desired that these recruits very much represent the cultural diversity of the nation. In other words, the Navy is looking for a force that resembles American society, which is accessed from all regions of the nation.

In order to accomplish this goal, CNRC utilizes "goaling models" to predict how many recruits the Navy should be able to attract in geographic regions throughout the country. The Navy's Enlisted Goaling and Forecasting Model is one of the tools used in this process. Utilizing a significant amount of data, past and present, the Enlisted

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Goaling and Forecasting Model predicts a major portion of the "goal shares" which are assigned each year to the Navy's Recruiting Regions and Districts. At present, the Navy recruiting structure is comprised of four Regions and 31 Districts, which can be seen in Figures 1 and 2.

Figure 1.   U. S. Navy Recruiting Organization Map
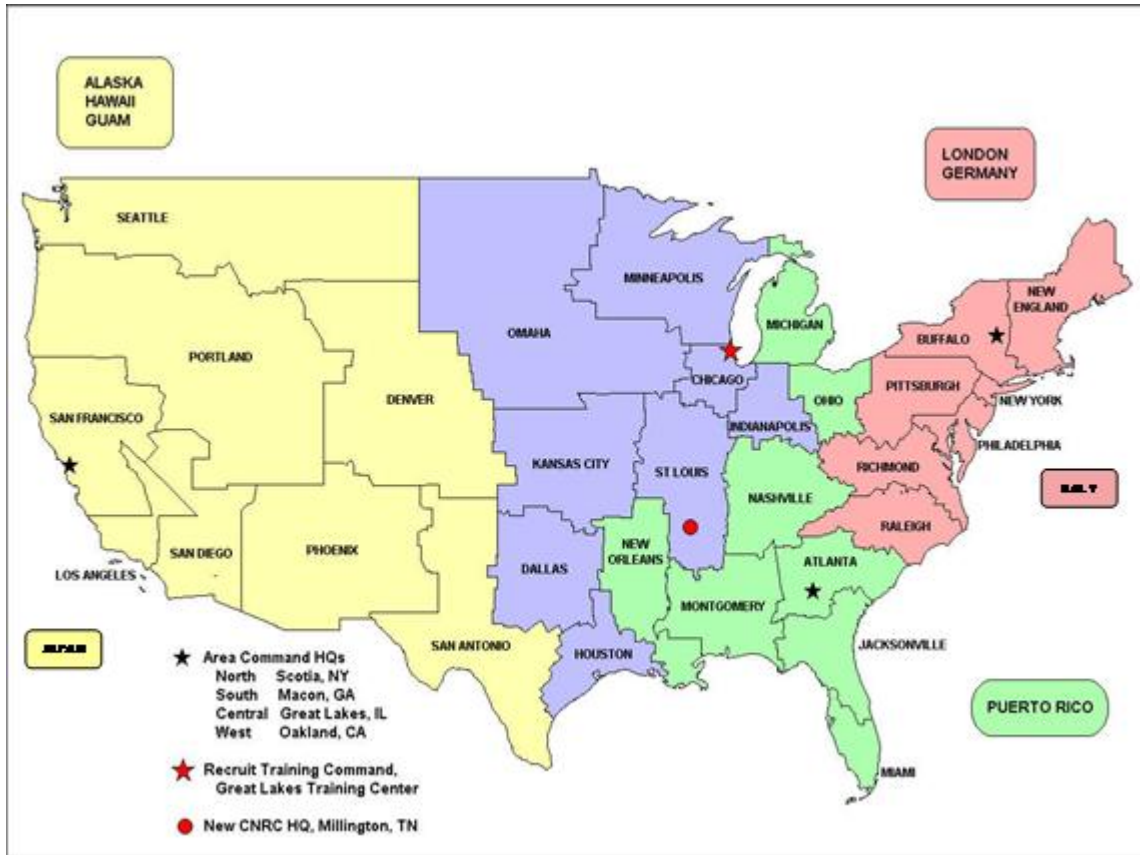
Source: From CNRC "Roadshow" Briefing, 2003

CNRC, using locally generated goal shares, generates "hard" goals which are set for the four Regions. These goals consist of new contract objectives (NCO), as well as accession goals. Additionally, CNRC provides recommended goals for each of the Navy Recruiting Districts (NRDs) to the Regions.

The regional recruiting commands then "goal" their NRDs. Each regional recruiting command is autonomous, with the authority to exercise its own best judgment

Figure 2.   Navy Recruiting Command Organizational Structure

Commander Navy Recruiting Command (CNRC)			
Region North	**Region South**	**Region Central**	**Region West**
NRD New England	NRD Montgomery	NRD Chicago	NRD Denver
NRD Buffalo	NRD Jacksonville	NRD Kansas City	NRD Phoenix
NRD New York	NRD Atlanta	NRD Minneapolis	NRD Los Angeles
NRD Raleigh	NRD Nashville	NRD Omaha	NRD Portland
NRD Richmond	NRD Ohio	NRD Dallas	NRD San Francisco
NRD Philadelphia	NRD Michigan	NRD Houston	NRD Seattle
NRD Pittsburgh	NRD New Orleans	NRD Indianapolis	NRD San Diego
	NRD Miami	NRD St. Louis	NRD San Antonio

Source: After CNRC "Roadshow" Briefing, 2003

in assigning goals to its recruiting Districts; they are not bound by CNRC recommendations for NRD goals. The same is true for each Navy Recruiting District,

who in-turn, must assign its share of regionally-assigned goal, to its recruiting zones and stations. The end result of this process is that each of the more than 4400 active duty Navy Recruiters (as of 2004) are assigned specific goals to attain on a monthly basis.

As mentioned, CNRC assigns both new contract objectives (NCO) and accession goals to the recruiting Regions. Accession goals are assigned to Commander, Navy Recruiting Command and are the number of recruits the Navy desires to have actually join active military service during a given fiscal year (FY). In other words, this is the actual number of recruits the Navy desires to send to recruit training in any given year and is vital in the Navy meeting the desired fiscal year endstrength. New contracts, on the other hand, are new contracts for recruits who desire to join the Navy, but who generally enter active duty service much later.

Rarely does a new recruit sign an enlistment contract and immediately enter military service. A recruit signing a new contract to join the Navy may actually wait upwards of a year to enter recruit training and active military duty. This delay in service can be due to a number of factors, such as awaiting high school graduation or for an open seat in a training school for a Navy rating (a particular job or field). Thus, nearly all potential recruits signing new contracts enter the Navy's Delayed Entry Program (DEP). The DEP thus becomes a "holding pool" where newly contracted recruits await their actual shipping date. As mentioned, after a period of time that lasts as long as 12 months, the majority of this pool of contracted recruits will then become accessions into the Navy.

The assigning of NCO goals by CNRC allows for control of DEP size, in much the same way accessions control for total Navy endstrength at the end of each fiscal year. CNRC is able to estimate future accession requirements and base current year contract goals on the future DEP requirements needed to meet these future accessions. This maximizes the likelihood of achieving out-year accession requirements. While accessions are vital to meeting today's mission, new contracts are important in meeting tomorrow's recruiting mission.

B. PURPOSE

The primary purposes of this study will be to examine the process by which the Navy assigns enlisted recruiting goals in an equitable manner to each of the recruiting

Regions and Districts, as well as to determine what input the Regions and Districts have into the creation of these goal shares and by what means. Additionally, this study will seek to understand the variables used in the Enlisted Goaling and Forecasting Model, how these variables have changed over time, and how they might change in future years. Finally, a look at some of the many other factors within the recruiting organization that may affect the assignment and achievement of recruiting goals will be performed.

C.   BENEFITS OF THE STUDY

There have been studies conducted in the past dealing with the issue of Enlisted Goaling and specifically the Enlisted Goaling and Forecasting Model, the most recent of these studies being conducted by the Center for Naval Analyses (CNA) in 1999. This CNA study is important because it is focused solely on the model currently used by CNRC. While this thesis will not examine the inner-workings of CNRC's goaling model, as the 1999 CNA study did, it will examine the variables used in the model and their relevance to future forecasting. Additionally, an understanding of the processes used within the Navy to develop and distribute goals shares will allow for further evaluation of the Enlisted Goaling and Forecasting Model, as well as possible improvements in the process of assigning goals.

At present, there is little understanding of the process by which goal shares are developed and distributed, outside of those who actually complete this process, at various levels throughout the recruiting organization. While the Navy has been quite successful in recent years with respect to meeting recruiting goals, as with any string of good fortune there will again come a time when meeting recruiting mission proves much more difficult. A proactive review of current practices may allow for further enhancement of the goaling process, while simultaneously providing a better understanding to the recruiting community as a whole of the current process by which their workload is determined. This thesis will also examine observed trends in the youth labor market during the All-volunteer Force (AVF) years to determine if CNRC's current forecasting model is designed to meet the recruiting needs of the future. Finally, an understanding of the goaling process will allow for an evaluation of programs at every level of the recruiting organization to ensure they are aligned with the overall goals of the Navy Recruiting Command.

D. RESEARCH METHODS

In conducting research for this study, it became readily apparent that while there had been numerous studies conducted relating to the supply of enlisted personnel for the armed forces, much of this work had been conducted during the 1970's and 1980's. This coincided with the end of conscription, during which time there was significant debate as to whether the All-volunteer Force (AVF) could be sustained. As a result of this debate and recruiting difficulties in the late 1970's, numerous studies were conducted in an attempt to determine the factors that most affected the decisions of the young men the services were trying to attract. Though many of these studies are nearly 25 years old, they are still useful in that they attempt to answer many of the same questions that are relevant today. A review of these earlier studies can also be useful in that they identify many of the same factors used in today's enlistment supply models. Identifying the impacts that the variables of 20 to 25 years ago had then and now can also shed some light on how these variables have changed over the years and help determine whether they are still viable candidates for predicting the future supply of new enlistees.

In addition to studying the factors that impact the supply of enlisted personnel to our armed forces, in particular the Navy, another primary purpose of this study is to understand the process by which goal shares, once generated, are distributed to the Navy's Regions and Districts. In attempting to determine the process for distributing goals it became apparent that this would prove to be the most difficult challenge of this entire thesis. There is very little in the way of written documentation on the process by which the Navy generates and distributes goal shares. Because of this, most of what was learned and will be discussed in this thesis on goal share generation and distribution, was obtained through personal interviews conducted with personnel at the Navy Recruiting Command in Millington, TN, Navy Recruiting Region West in Oakland, CA, and Navy Recruiting District, San Francisco. Through these interviews an attempt was made to obtain an understanding of the processes and procedures used to generate enlisted goaling numbers and the dissemination of these numbers throughout the recruiting community. For the purposes of this thesis, the analysis of the distribution of enlisted goal shares will be limited to that of goaling the Navy's Recruiting Regions and Districts.

II. BACKGROUND OF THE ENLISTED GOALING PROCESS AND MODEL

A. ENLISTED RECRUITING

Commander, Navy Recruiting Command is responsible for recruiting all non-prior and prior service men and women for active duty military service in the United States Navy. To this end, responsibility for the actual recruitment of these primarily young men and women is directed to the Navy Recruiting Districts, of which there are currently 31, through the four Regional Recruiting Commands. The NRDs are responsible for the recruiting efforts within their districts, down to the zone and station level. At this level, we find the individual recruiter in direct contact with potential Navy recruits.

Through the years, recruiting has seen its ups and downs. At times, the recruiting effort seems relatively easy. In recent years for example, the Navy has had little difficulty in achieving its national recruiting mission. Unfortunately, success in recruiting has not always come so easy. As recently as the late 1990's, the Navy failed to achieve its national recruiting goals. There are many factors that drive these ups and downs in recruiting efforts, many of which will be explored in this thesis.

Over the years, numerous studies have been conducted to determine the primary factors that drive the success of recruiting efforts. We can be sure that factors such as current economic conditions, military pay and benefits, and the size and effectiveness of the Navy recruiting force will have a significant effect on recruiting success. There are many other factors, however, which will impact our ability to attract the quantity and quality of recruits necessary to meet requirements.

Factors across the country, outside the Navy's control, such as the population of eligible recruits, college entrance rates, and the veteran population all directly impact the Navy's ability to meet recruiting mission. Many other factors, within the Navy's control, such as bonuses, advertising, the number of new jobs made available to female recruits, DEP size, and the desired quality mix of new recruits will also impact the overall effectiveness of recruiting efforts. Quality mix can be described as the minimum

requirements for High School Diploma Graduates (HSDGs) and minimum percentages for upper (≥50%) Armed Forces Qualification Test (AFQT) scores.

All of the factors listed above, and still others, will in some way determine whether the Navy is successful or not in meeting its recruiting mission on a continuing basis. Despite achieving unprecedented reenlistment numbers among first-term sailors, topping 60% in recent years, and a reduction in the overall size of the force, the U. S. Navy is still faced with replacing approximately 10% of its personnel endstrength on an annual basis. Due to the importance of continually attracting and enlisting the desired quantity and quality of recruits, the Navy Recruiting Command goes to great lengths in its efforts to locate and contract those personnel who will successfully "man" our fleets for the years ahead.

B. ENLISTED GOALING

Enlisted goaling, in its simplest form, is the process by which the Navy determines the quantity and quality of people it desires to recruit in any given fiscal year and then assigns those goals to its recruiters across the country. In reality, this process is much more difficult and often a time-consuming task. Simply achieving the desired quantity of recruits, for example, in and of itself would not necessarily present all that much of a challenge in meeting the desired annual recruitment goals. But achieving the desired quality in our new recruits proves a bit more difficult. Finally, achieving this desired quantity and quality mix, while simultaneously recruiting young men and women who represent a demographic cross-section of our society from all areas of the country can make this task downright difficult.

To aid in the prediction of the supply of newly contracted recruits the Navy utilizes an Enlisted Goaling and Forecasting Model. This model is used only to predict the supply of net new male non-prior service (NPS), High School Diploma Graduate (HSDG), Test Score Category (TSC) I-IIIA contracts. These are predicted male contracts for those who are high school diploma graduates, who score at or above the 50th percentile on the Armed Forces Qualification Test (AFQT) and have not previously served in the armed forces. Net new male A-cell contracts, refers to the total number of contracts written minus the number of contracts written to those who eventually attrite in a given time period (fiscal year). The model is therefore, a tool used to aid in predicting

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the "real" supply or actual increase in the number of male A-cell recruits who are placed into the Navy's Delayed Entry Program (DEP) during a specified time period. Since Navy recruiting involves the recruiting of more than just those males who have graduated high school and have scored in the highest AFQT test score categories, the process of generating goal shares for subordinate commands is much more involved than simply running an econometric model. Figure 3 gives an illustration of the requirements which drive the desired quality criteria of newly contracted personnel, which are described below.

1. A-cell Recruits

A-cell recruits are those who are high school diploma graduates and who score at or above the 50th percentile on the AFQT (TSC I-IIIA). These are the most desirable recruits for a number of reasons:

- They have the highest program qualification rates

- They exhibit the lowest first-term attrition rates

- They represent fewer disciplinary problems

- They have the lowest training costs

- They show the best career performance (Sladyk, April 2004)

As one would expect, being the most desirable candidates for enlistment, these are also the most difficult and most expensive people to recruit. The Navy's target goal for A-cell recruits in FY04 was 67%.

2. B-cell Recruits

B-cell recruits are those who have scored well on the AFQT, at or above the 50th percentile (again, TSC I-IIIA), but do not possess a traditional high school diploma. While their test score is indicative of the aptitude the Navy desires, the inability to complete high school is often a sign of the lack of commitment needed to succeed in the armed forces. While they qualify for many of the programs the Navy has to offer, they also exhibit the highest first-term attrition of any category of new recruits. The result is lost productivity and training dollars and increased recruiting expenses as attrites must be replaced and retrained as new recruits. As a result of these drawbacks associated with

non-high school graduating recruits, the Navy currently limits the number of these individuals who can be accessed to 5% of all new accessions.

Figure 3.   Enlisted Quality Requirements Drivers

3.   Cu-cell Recruits

Cu-cell recruits are high school graduates who score between the 35th to 49th percentiles on the AFQT (TSC IIIB). Due to their lower test score category, they qualify for fewer and less technical job skill programs than do their upper test score category (TSC) counterparts. Their attrition rates, however, while not as low as those falling into the A-cell category, are lower than B-cell recruits.

4. Cl-cell Recruits

Cl-cell recruits are high school diploma graduates who score between the 24th and 34th percentiles on the AFQT (TSC IVA). Those falling into the Cl-cell category are not currently eligible for accession.

5. D-cell Recruits

Making up the D-cell category are those who have failed to graduate from high school and have scored below the 50th percentile on the AFQT (TSC IIIB or below). Persons falling into this category are also not eligible for accession.

The desire to recruit A-cell personnel becomes readily apparent when one considers that the Navy, like many other corporations across the country, attempts to become more fiscally responsible, which often requires doing more with less. In doing so, the U. S. Navy is continually becoming more technically advanced. In order to operate its most technologically advanced systems, the Navy desires to recruit those with the highest aptitude for learning, as well as those who show the most likelihood of completing there enlistments. These are clearly A-cell personnel.

The process of enlisted goaling begins with Accession Goals and Requirements, which are established by the Bureau of Naval Personnel, Military Personnel Plans and Policy (N13). These goals are established based in part on Navy fiscal year endstrength requirements. These accession goals and requirements are then forwarded to the Commander, Navy Recruiting Command. At this point, CNRC (N5) begins its work utilizing the Navy's Enlisted Goaling and Forecasting Model. An overview of the overall goaling process can be seen in Figure 4.

The forecasts obtained from the Goaling and Forecasting model are used in a number of ways. In combination with a number of other factors, which will be discussed in Chapter III, CNRC then generates goal share percentages which are ultimately applied to new contract goal and accession requirements. Additionally, CNRC uses these forecasts as a sort of gauge to predict the likely success of meeting contract goals for the upcoming year. Should the model forecast the desired number of contracts or greater, CNRC can feel confident that the resources are in place for the recruiting efforts of the upcoming year to be successful. On the other hand, should the model forecast contracts

significantly below requirements, it can signal problems in the year(s) ahead. Commander, Navy Recruiting Command can then lobby for recruiting resources, in the way of additional recruiters, larger enlistment bonuses, easing of quality standards, or a host of other options, which will provide the Navy Recruiting Command the most reasonable chance possible to meet its mission.

Figure 4.   NCO/Accession Goaling Overview
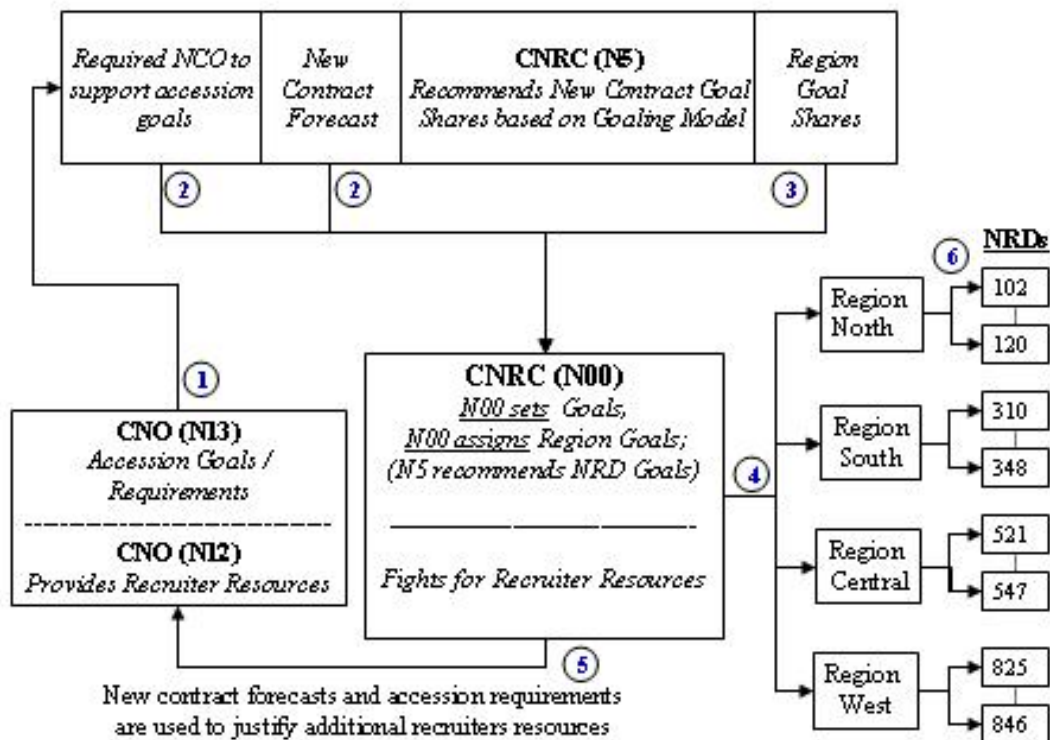
Source: "Regression Coefficients used in Enlisted Goaling Model," CNRC Briefing, April 2004.

At this point, the distinction between New Contract Objective (NCO) and Accessions should be made. As mentioned above, N13 provides CNRC with new accession requirements for each fiscal year. Accessions are simply the number of new recruits that are actually sent off to recruit training each year. Based on a number of

factors, which include projected fiscal year endstrength and current retention and attrition rates, these new accessions will round out our naval force for many years to come.

NCO, on the other hand, is the actual number of new contracts that recruiters must "write." A potential recruit signing a new contract to join the Navy is really nothing more than a recruit taking the first step toward joining the Navy. This begins what could be considered a long process before this new contract actually becomes an accession. The signing of a contract usually results in the individual entering the DEP, with an assigned shipping date to recruit training up to 12 months in the future. Again, not until the newly contracted recruit is shipped from the local Military Entrance Processing Station (MEPS) to recruit training is he/she considered an accession.

While the NCO and accession numbers are not normally the same, they will also not generally be drastically different. The primary reason these numbers will differ will be based on the desired size of the Delayed Entry Program (DEP). DEP size is generally calculated as a percentage, the number of persons currently in the DEP divided by the number of current year accessions. As of today (March 2005), the Navy currently has a DEP size of approximately 70% (27,000 members currently in the DEP / 38,500 projected current FY05 accessions).

Analysis of projected future manning levels and projected future accession requirements, to meet those needs goes a long way in determining how new contract objectives (NCOs) are set relative to current accession needs. If it is desired to lower the overall size of the DEP, NCO can be set equal to or below the number of accessions. Assuming all else equal (achieving anticipated DEP attrition), the size of the DEP (in total numbers) will be reduced by accessions minus NCO. The amount of DEP attrition also impacts DEP size. DEP attrition is anticipated and attrition rates greater than expected will lower DEP size, while DEP attrition lower than expected will result in increased DEP size. Again, however, DEP size is generally referred to as a percentage. Thus, even though the size of the DEP may be reduced, say to 25,000 personnel, the DEP percentage is based on accessions. So, for example, if we assume that we were going to reduce the size of the DEP to 25,000, a reduction of 7.41% (from the current level of 27,000), but next years accession requirement falls to 36,000, we would actually maintain

our DEP size at roughly 70%. There are a number of reasons why the size of the DEP might be modified, however, for the purposes of this project, in what are becoming increasingly difficult times for recruiting, particularly for the Army and Marines, it should suffice to say that a healthy DEP helps to increase the likelihood that future Navy recruiting goals will be attained.

CNRC goal share percentages, generated for the Navy Recruiting District (NRD) level, are aggregated to the regional level where they are then used to assign actual goals to each recruiting Region for NCO and accessions. CNRC also provides recommended goals for each Recruiting District to the regional commands. However, the regional commands have the ultimate authority to assign goals to their NRDs as they see fit, whether they agree with CNRC's recommendations or not. Whether or not the regions choose to use CNRC's recommended goal shares for their NRDs, assigned NRD goal shares are not generally significantly different from those recommended.

While the focus of this study is meant to end with the goaling of the NRDs by their parent Regions, it should be noted that the NRDs are each responsible for the goaling of their zones and stations. Again, as with the Regions, each NRD is autonomous in the assignment of goals within its District. No recommendations from CNRC are provided below the NRD level, therefore, the NRDs operate using their own standards and methods for assigning goals within their own Area of Responsibility (AOR).

C. PREVIOUS WORK

As was mentioned in Chapter I, a number of studies have been previously conducted in the area of predicting the supply of enlisted personnel for our armed forces, as well as studies completed in an attempt to determine what motivates youth to enlist. As with the enlisted goaling and forecasting model used by CNRC today, nearly all of these previous studies focused on predicting the supply of male, high quality recruits. This is not surprising considering that during the 1970's and 1980's, as it is today, the majority of those recruited for military service are male recruits, who fall into the A-cell category (I-IIIA).

1. Determining Enlisted Supply in the All-volunteer Force

"The beginning of these enlistment supply driven studies occurs around 1970, in support of the President's Commission on an All-Volunteer Armed Force." (Goldberg,

1983) Many of these early studies of enlisted supply focused primarily on the youth male population and the civilian wages these youth could earn as compared to military pay. One such study, conducted by Ash, Udis and McNown (AUM) in 1983 did just this. In addition, AUM looked at the impact that the unemployment rate among the youth population, the potential for being drafted and time might have on the accessions of males. The estimated goal of the AUM study was designed to determine accessions for a given population based on the above listed factors. The results of the AUM supply model indicated that pay was a contributing factor to accessions, as was an increase in the likelihood of a draft. Interestingly, the study found no significant effect of unemployment on recruiting. The AUM report states:

> The evidence on the lack of an unemployment effect on accessions is overwhelming. In none of twenty regressions is the unemployment variable significant at even the 35 percent significance level. (Ash, Udis and McNown, 1983.)

In addition, the AUM study found, "a weak but pervasive change in tastes away from military service." (Ash, Udis, and McNown, 1983) Aside from the unemployment results obtained by the AUM study, which will be discussed below, these early finding were the beginning of many studies to come in which more precise predictions of enlisted supply would be sought. Interestingly, this study was one of the last to use a variable in an attempt to capture the affects of a possible return to the draft. This variable was included due to concerns at the time over difficulties in military recruiting and calls by many for a return to a draft. While this is certainly not a variable considered in today's CNRC supply model, this is mentioned here to point out that as we are currently involved in a military conflict, whisperings of a return to a draft have been heard, however unlikely that they are. While this is probably not a legitimate concern for predicting the supply of potential recruits any time soon, it may someday once again, prove to be a critical factor in the supply of military personnel, particularly for the Navy.

A 1985 study, conducted by Dale and Gilroy, addressed the perceived shortcomings of the AUM study. The problem with the AUM study, as Dale and Gilroy (DAG) point out, is that, "their empirical analysis is based on accessions." (Dale and

Gilroy, 1985). Both studies did agree, however, that contracts, not accessions are the correct data to use. DAG point out:

> Contracts are supply determined--individuals may sign contracts to enlist now, but actually begin their enlistment periods up to a year later. Accessions, on the other hand, are more demand determined by recruiters, since recruiters normally have three-month quotas to fill. Thus, contracts data are the appropriate type to use for estimating military supply equations. (Dale and Gilroy, 1985)

While this study focused only on high school graduates (which DAG believed were the most relevant target group) and was a supply model constructed for the Army, its findings were nonetheless relevant to the Navy. Dale and Gilroy were able to show that a relationship between contracts and unemployment rates did in fact exist. They were able to show that a seasonal affect should be included in supply models due to the fact that, while contracts were written year round, accessions spiked during the summer months. Dale and Gilroy also included variables for educational benefits (more important to the Army than other services - due to typically shorter enlistments) and an attempt to capture recruiter efforts. Finally, as part of the pay variables included in their model, they determined that leading pay indicators were more precise than lagged effects.

With each additional study completed, additional factors were considered for inclusion into enlistment supply models and models received continual revision in order to provide the best possible predictions. Additional studies also confirmed what was previously learned and expanded the explanations for prior conclusions. Pay for example, was a focus of many studies.

Due to decreasing youth populations in the 1980's and the increasing importance of pay in predicting the supply of contracts and the actual accessing of young men into the armed forces, pay was seen as vital to recruiting success in meeting predicted shortfalls at that time. Pay was seen as a way to increase the number of high quality recruits who could be contracted; this remains true today. Another important element of the pay variable, mentioned by DeBoer and Brorsen (1989), was that pay is often adjusted (raised) based on how successful recruiting and retention efforts have been in previous years. This is important to note here, because as will be pointed out when the

variables used in today's goaling model are discussed, this can present difficulty in determining the true effects of some of the included variables.

DeBoer and Brorsen also made the case for limiting the dependent variable of the supply driven model to that of high quality recruits. They reasoned that, "high quality recruits are likely in short supply, while lower quality males are more likely demand constrained,…the dependent variable of the enlistment supply equation is restricted to male recruits scoring in AFQT categories I-III." (DeBoer and Brorsen, 1989) This is important because this is the focus of the CNRC model in use today and holds true in that essentially all high-quality recruits who desire to join the Navy today will be contracted, while the demand for contracts of those who fall into lower quality categories exceeds the supply the Navy is willing to offer. This has become even more evident in recent years, where the Navy has experienced high first-term retention, decreased accession and endstrength numbers, and increasingly higher percentages of high quality (I-IIIA) recruits.

2.   Center for Naval Analyses (CNA) Studies

The Center for Naval Analyses completed a study (Goldberg, 1983) that provided the groundwork for what is now CNRC's Enlisted Goaling and Forecasting Model. Goldberg points out:

> For the purposes of estimation, our theoretical analysis of enlistment supply suggests that the supply of enlistees depends upon economic factors, demographic factors, and recruiting resources. The economic factors include relative military pay, GI Bill benefits, civilian unemployment, and federal youth programs; the demographic factors are population and race; and the recruiting resources are recruiters of each service and Navy advertising." (Goldberg, 1983)

Many of these factors are still utilized in CNRC's current model. Key to this study was its focus on population, recruiters and advertising and the cost-effectiveness of increasing supply, via the GI Bill, pay, recruiters, or advertising.

While many previous studies simply assumed a proportional effect of population and supply, leading many models of the time to predict huge shortfalls in the supply of recruits during the 1980's when the youth population was declining, Goldberg, determined that, "the effect of population declines on accessions is less than

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proportional." (Goldberg, 1983) This was important, because it meant that the great shortfalls that many had predicted, would not be as bad as many had thought and it shed light on the relationship that recruiters might have with relation to the size of the population base from which they recruit.

Goldberg also concluded that pay was vital to the successful attainment of contracts. This was consistent with most previous studies. Next to pay, recruiters had the most significant effect on the supply of new contracts. Advertising, as had been noted in previous studies had a positive but rather small affect on new contracts.

Finally, Goldberg determined the marginal cost of increasing new contracts. In his analysis, the GI Bill and bonuses (assumed $2,500) were quite expensive at $200,000 and $29,400, respectively. Recruiters and advertising, on the other hand, were much less expensive, at $5,800 and $1600, respectively and, therefore, the preferred options for increasing the supply of new contracts.

The Center for Naval Analyses, as recently as 1999 (Goldhaber), conducted a thorough analysis of the Navy's current goaling model. The primary objectives of this study were to determine:

- Whether the current econometric specification of the model is appropriate or whether the inclusion of alternative variables or the use of an alternative functional form increases the accuracy of the model.

- Whether the basic form of the model also serves to predict recruit contracts for a higher quality subset of A-cell (namely, HSDGs from AFQT categories I and II)

- Whether the appropriate supply model for workforce recruits is significantly different from the model for high school seniors (Goldhaber, 1999)

This thesis does not attempt to replicate the work performed by Goldhaber (1999). Instead, this thesis will focus on the results produced by CNRC's goaling model, the variables used in the model, and the assignment process of goal shares once generated through, at least in part, use of CNRC's goaling and forecasting model. Nonetheless, the key findings of Goldhaber (1999) can provide some insight into a review of the variables currently used in CNRC's goaling model. Chief among Goldhaber's conclusions is that

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"while some minor modifications to the model may improve its predictive capability, they will not lead to dramatic improvements given that the specification of the current goaling model is already quite good." (Goldhaber, 1999). Finally, the only major recommended change to the model variables was that the advertising variable be removed because, "there is good reason to believe from a theoretical perspective that this variable is not truly exogenous, and our empirical work suggests that this is, in fact, the case." (Goldhaber, 1999). In essence, CNA hypothesized that advertising is an endogenous variable that is jointly determined with net new contracts, the dependent variable. Instead, the recruiting success that the Navy was able to achieve was actually the driving factor in determining advertising dollars in future years. To include advertising in the model would include estimation of a simultaneous two-equation model, perhaps by two-stage least squares. Because of this, CNA recommended dropping the advertising variable from the model. This is pointed out here because currently the advertising variable is still used in CNRC's goaling model. The reason for its continued use will be discussed in Chapter III when the variables used in the model are explained.

3.   1990's Recruiting Slowdown

The above mentioned studies are only a sampling of the many studies which have been conducted in the area of predicting enlistment supply during the All-volunteer Force (AVF). While these studies attempt to provide insight into the factors that should be utilized in predicting future enlistment supply, it is also important to understand that changes in the youth population that the Navy is attempting to attract have also taken place over the years. Understanding past and current trends, as they relate to propensity for military service, in today's youth are also vital to ensuring that current enlistment supply models provide the best possible future projections. A Defence and Peace Economics study addressed many of these issues. This 2003 study, conducted by Warner, Simon and Payne (WSP) provided an evaluation of the success of recruiting during the 1989 – 1997 period.

During the early years of the WSP study (1989 to 1992) all services experienced a strong recruiting environment including increasing percentages of high quality recruits. During this time, the Navy saw its percentage of high quality recruits increase from approximately 47 percent to nearly 64 percent. The later years, however, saw just the

opposite. From 1993 to 1997, with continually declining numbers of enlisted contracts, the Navy saw its percentage of high quality recruits drop to 58 percent. WSP attempted to determine the leading causes of this slowdown. Understanding these causes could be useful in shedding light on the future successes of recruiting.

Much of the decline in enlistments during this period can be attributed to the reductions in the size of the Navy, while the other three services accessed a relatively constant number. The significant decrease in high quality recruits, however, was experienced by all services. What were the factors that lead to this decrease in recruit quality? In order to uncover the causes for this recruiting slowdown, WSP looked at changes in economic factors, recruiting resources, enlistment incentives, and population demographics during these years across individual states. The data was evaluated based on two time periods, 1989 to 1993 and 1994 to 1997, to determine how each of these factors affected recruiting during these two different periods. Differences in the impacts of these variables across the two time periods would possibly reveal the potential causes of the slowdown. The findings of this study are potentially critical to determining future trends in the recruiting environment and potential shortcomings of the Navy's goaling model and its predictions of recruiting success in the years ahead.

With respect to economic issues, WSP determined that, because relative military to civilian pay remained essentially constant over the second time period, "the decline in military recruiting cannot be attributed to a decline in relative military pay." (Warner, Simon and Payne, 2003) Unemployment, on the other hand, fell significantly from 1992 to 1997 (dropping from 7.5% to 4.9%). WSP believed that this impacted all service's ability to attract recruits during the later period and ultimately cost the combined services almost 20,000 recruits.

In evaluating recruiting resources, the findings related to recruiters were particularly noteworthy. "The estimated late-period recruiter elasticities were larger than the early-period elasticities in three of the four Services (Navy, Air Force and Marines)…" (Warner, Simon and Payne, 2003) The result of this finding is that, while contracts per recruiter were declining over the years of this study, recruit responsiveness

to recruiters and therefore, recruiter effectiveness had increased. Navy advertising was also determined to be an important factor in attracting recruits.

Some additional notable conclusions were made with respect to demographic factors. WSP concluded,

- Each 10% increase in college attendance reduced DoD-wide high quality recruiting by 12.5%...because college enrollment for high school seniors rose from 56 to 62% (an increase of 11%) from 1987 to 1997, enlistment would have been about 14% (18,200) higher had the fraction of youth attending college remained at its FY 1987 level. Rising college enrollment has apparently played a significant role in the decline in high- quality enlistment.

- A 10% increase in median family income (across states) resulted in a reduction of 8.7% high-quality recruits for the Navy.

- Propensity (to enlist) to be significantly positively related to parents' military service (as determined in a 2001WSP study) and, at the national level, this percentage (recruits having parents with prior military service) fell from 49% in 1987 to 36% in 1997, a decline of 26%. The elasticity implies that high-quality enlistments would have been 35% higher had the veteran population not declined over the 1987–1997 period. (Warner, Simon, and Payne, 2003)

These finding are particularly important here, as college entrance rates for high-school graduates has continued to rise in the years since this study was completed and is believed to continue to do so in the foreseeable future. Likewise, the percentage of the population with prior military service will undoubtedly continue to decrease as the services continue to decrease in size.

Finally, as Goldberg had done in his 1983 study, Warner, Simon and Payne estimated the cost effectiveness of various recruiting resources (pay, recruiters, advertising, and college benefits), which could be utilized to recruit additional high quality recruits. WSP concluded, as did Goldberg, that recruiters and pay were the most cost effective means to achieve increased high quality recruiting numbers. Additionally, they concluded that while targeted incentives were not the most economic method to improve quality recruiting numbers, they could be effective tools in, "skill and term-of-enlistment channeling functions." (Warner, Simon and Payne, 2003) Finally, as

Goldberg had calculated, an across-the-board pay increase was the least effective and most costly option for improving high quality recruits.

4. Determining Recruiter Productivity

Recruiter productivity is a widely discussed topic in today's recruiting environment. Production per Recruiter (PPR) is the term given to the measure most often used today to describe the performance of recruiters. PPR has become an important issue when discussing recruiting goals because of the dramatic drop that has been experienced in this measure over the past 15 years. Figure 5, provided by CNRC, gives an illustration of how PPR has declined since 1990. Net New Contracts Attained (NCA) refers to the actual number of accessions a recruiter produces. In other words, NCA is the number of new recruits a recruiter has contracted that ultimately ship to recruit training. This number can also be derived by subtracting the total number of contracted recruits who eventually attrite from the DEP from the total number of new contracts produced.

Figure 5. Net NCA Production Per Recruiter (PPR)
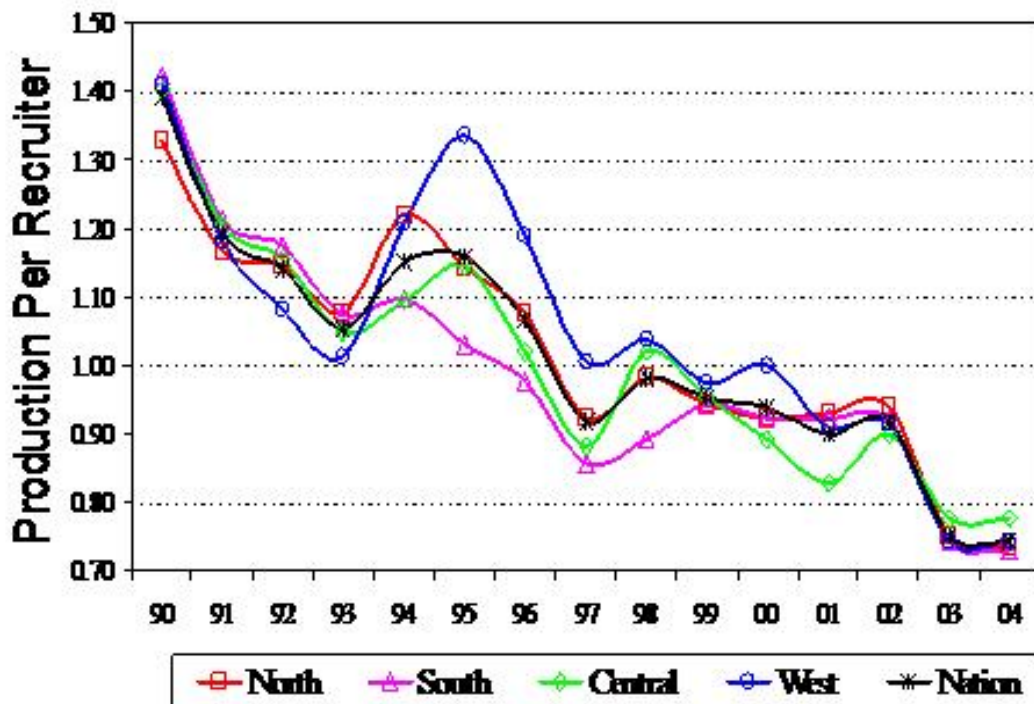
Source: "Enlisted & Officer Goaling Models," CNRC Briefing, January 2005.

This downward trend is recruiter productivity has long been debated as one of the principle factors for the increasing costs associated with recruitment of men and women for today's military service. This has been especially true in recent years, as recruitment cost have skyrocketed. Figure 6 highlights this rise in recruiting costs in recent years. The emphasis on maximizing recruiter productivity is not a new concept, however.

Figure 6.   DoD Recruiting Costs (FY95 – FY01)
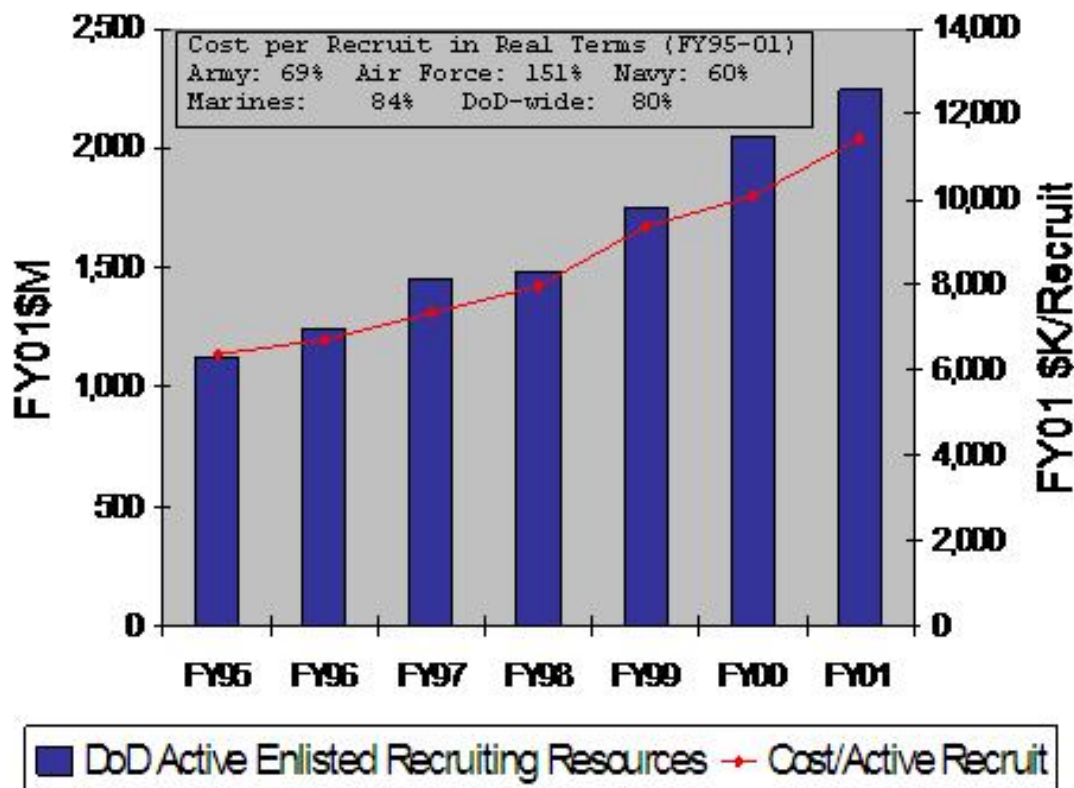
Source: CNRC "Roadshow" Briefing, 2003.

As early as the 1970's, the Navy formulated a recruiter incentive program named the Freeman plan. The Freeman plan was essentially a point-based reward system used by the Navy to improve the quantity and quality of the new contracts obtained by its recruiters. Higher point values were assigned for high quality contracts and recruiters were penalized for poor performance. Recruiters were rewarded for their efforts, based

on average accumulated points over a 12-month period. Rewards, based on the average point level achieved over the recruiting period ranged from Certificates of Commendation to Meritorious Advancement.

A similar program aimed at maximizing recruiter productivity remains in place today. "The Enlisted Recruiter Incentive System (ERIS) is a point-based program for enlisted recruiting that provides the basis for Annual Production Awards and National recruiter of the Year/Classifier of the Year selections." (COMNAVCRUITCOMINST 3100.1, 2004) While regional and district level recruiting commands are encouraged to develop their own recruiting incentives/awards programs, the focus for this thesis will remain on the national program, ERIS.

As with the initial Freeman Plan, today's program encourages high quality contracts through a point system that rewards the recruitment of HSDGs in the upper mental groups. Additional points are also earned for diversity, referrals, and actual accessions. Points are lost for DEP attrites based on when the attrition occurs. A larger deduction applies to in-month attrites than to out-of-month attrites.

PPR is of great concern here because of the role that past production plays in the assignment of recruiting goals. The goaling models used for current recruiting are based generally on anywhere from 3 to 7 years of previous recruiting experience. The difference in PPR over time and across regions and districts can have a significant impact on how areas are goaled in the future. While it is certainly not the objective of anyone in the goaling process to reward under-performance with lower goals, or to penalize superior performance with higher goals, this can become a problem in future goaling. The problems associated with relying on previous years performance and PPR, to in-part determine future goals, lay not with the process of goaling itself, but possibly in the assumption that PPR is an accurate reflection of recruiter effort or effectiveness and that the recruiter incentive system currently in place actually drives recruiters to perform at peak levels during their recruiting tours.

The use of PPR, while an accurate reflection of the number of contracts attained per recruiter for a given area (whether it be viewed at the level of the individual recruiter, nationally, or anywhere in-between) has some notable flaws. The most notable of these

flaws is based on what is actually being measured. In calculating PPR, the number of new contracts attained (NCA) for a given area in a specified period, is divided by the number of production recruiters * X months (where X is the number of months being evaluated). For example:

$$1500 / (100 * 12) = 1.25$$

Where:

1500 = new contracts attained (NCA)

100 = number of production recruiters within the area

12 = number of months in a year

In this example then, PPR would be equal to 1.25, or just over one contract attained, per recruiter, per month, on average. The difficulty in making assumptions about the effort or effectiveness of today's recruiters with those of years past, based on the information provided in Figure 4, comes from a number of factors.

First, as was mentioned previously in the Ash, Udis and McNown study of 1983, and as has been concluded in a number of other more recent studies,

> Many of today's teens do not view joining the military as being successful. Success to teens today consists almost entirely of going to college. The military is viewed as an option for teens that do not have the means for college, and college is the "default decision" for most teens that are undecided on what to do after graduating from high school. (Wilcox, 2001)

These studies point out quite clearly that over the years (as far back as the 1960's and 1970's), the youth population has shown a steady decline in their interest in military service; this downward trend in propensity to enlist continues today. The result of this trend is increased difficulty for recruiters in both contracting and accessing young men and women into today's military. In other words, recruiters today must work much harder for each contract they achieve. A decrease in the number of contracts per recruiter is thus, not necessarily a sign of decreased effort or effectiveness. In fact, to the contrary, today's recruiters may actually have to exert more effort than in past to achieve a smaller number or recruits.

Another important factor in the calculation of PPR is the issue of goals and recruiter population. Contract and accession goals change each year to meet the current needs of the Navy. The size of the recruiting force, on the other hand, is much more difficult to alter. An increase in the size of the recruiting force requires that additional candidates for recruiting duty be sought, screened, and trained. A significant increase in the size of the recruiting force can take years to achieve. Likewise, a large reduction in the size of the recruiting force can also require years. Personnel assigned to recruiting duty are in place for 36 months. Recruiting stations are generally leased long-term. The inflow of new recruiters to the fleet cannot simply be turned off; it takes time. The effect of these rigidities on PPR calculations can be significant. Thus, large reductions in the number of contract goals, as have been seen in recent years, with a relatively stable recruiting force, results in a dramatic decrease in PPR.

Using the example provided above, with an assumed reduction in contracts attained from 1500 to 1100 yields the following:

$$1100 / (100 * 12) = 0.917$$

As can be seen in the example provided, the resulting PPR from a 26 percent decrease in contracts attained from 1500 to 1100, reduces PPR from 1.25 to 0.917; a decrease of over 26 percent.

A buildup of the recruiting force, again, as we have seen in recent years, yields a similar result. Building on the example above, and assuming an increase of the recruiting force in this mock area from 100 to 120 persons, results in the following:

$$1100 / (120 * 12) = 0.764$$

Again, holding all else constant, increasing the number of recruiters from 100 to 120 (20 percent increase), the PPR number is reduced, in this example, from 0.917 to 0.764, a decrease of nearly 17 percent.

While the numbers above are hypothetical, they show how the PPR calculation can be misrepresentative of the level of effort and actual effectiveness of recruiters. While Figure 4 shows what appears to be a decreased productivity of recruiters over the last 15 years (PPR dropped approximately 46 percent from 1990 to 2004) these numbers

should be viewed cautiously. In our example, the decrease in contracts and increase in recruiters, which is representative of what has actually taken place in recent years, has resulted in a decrease in PPR of nearly 40 percent. While there are certainly many other factors which affect PPR, the point here is that recruiter production (on average over a given zone, district, region, or nationally) is driven in great part by the goals required and the number of recruiters assigned to attain those goals. Because goal and recruiter numbers remain fairly constant across a period (assuming goals are attained during that time period), PPR can essentially be calculated before the period even begins with relative accuracy. This casts doubt on the usefulness of the PPR number altogether.

In addition to the factors listed above, care must also be taken when viewing past production numbers due to the effects of ERIS. ERIS, as with point-based programs in previous years, is used to motivate recruiters to peak performance over the length of the recruiting cycle, the fiscal year. The problem with such programs is that, except in very rare cases, an enlisted recruiter will not be eligible for more than 2 full "competition" periods during his/her three year recruiting tour. Recruiters do not typically roll into or out of recruiting duty at the beginning or end of the recruiting cycle. Instead, they rotate in and out throughout the year. Thus, in most cases, recruiters are only really able to compete for ERIS awards during the two fiscal years falling in the middle of their recruiting tours. The recruiter is then left with two periods of less than 12 months at the beginning and end of their recruiting tours, during which they are essentially out of the running for any special recognition. As a result, the program provides little in the way of incentives for recruiters during these periods.

The effectiveness of such incentive programs was examined in a RAND Corporation (Asch, 1990) study. Asch provides a number of findings, the most notable of which are:

- Productivity rises over the production cycle.

- Productivity generally rises with experience but drops precipitously after a recruiter wins a reward.

- Recruiters reduce productivity at the end of their tour but reduce it less when they are closer to becoming eligible for a reward. (Asch, 1990)

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These findings are representative of the feelings and attitudes expressed during the gathering of information for this project. The first period in the recruiting tour when the new recruiter first reports aboard, is generally viewed as a training period. While the zone and station is still goaled with this asset in place it is generally understood that the other members will "pick up the slack" as the new recruiter becomes oriented.

The period during which the recruiter is eligible to compete for an award (again, the two full fiscal years during the recruiting tour) is generally viewed as the most productive time in the recruiter's tour. While these times are viewed as productive, on the whole, caution must still remain, as it relates to the effort level exhibited by some. "Stockpiling," as Asch called it, must still be considered today. While there are undoubtedly a number of ways to "game" the system, two are readily apparent.

First, there seems to be little incentive for recruiters to level load their effort, or even to maximize there effort at all times, under the current system. It is quite easy to "load up" early in the recruiting cycle and then take it easy and visa-versa. Doing so, undoubtedly results in the contracting of additional lower quality recruits when the recruiter is making his push, whether it is early or late in the recruiting cycle. It is believed that if the recruiter level loads his/her efforts, the quality of new contracts would increase.

Second, is the placement of newly contracted recruits into the DEP. Under ERIS, points are obtained, "at initial DEP-in/affiliation." (COMNAVCRUITCOMINST 3100.1, 2004)   As mentioned earlier, points are primarily lost due to DEP attrition. Thus, while ERIS has incentives built into the system to encourage recruiters to contract upper Test Score Category (TSC) recruits, there is nothing in the system to prevent recruiters from contracting recruits who they might otherwise believe to be less than likely to actually access. Because the system is set up to place newly contracted recruits into the DEP for a period of up to 12 months it becomes clear as to how the system can very easily be manipulated to contract less than desirable candidates and place them in the DEP (far enough into the next award cycle) so that if they do eventually attrite the loss of incentive points would not be realized until after the current award period had already ended. This

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scenario becomes even more plausible when the recruiter is expected to rotate from recruiting duty shortly after the end of an awards cycle.

While there is no direct evidence to suggest that the apparent shortcomings in the incentive system described above are actually occurring, the mere thought that they exist is likely evidence enough that they are present. One solution to these problems, as pointed out by Asch, is to shorten the length of the production cycle used in the incentive/reward system:

> Shortening the length of the production cycle may discourage recruiters from supplying less effort at the beginning of the production cycle, more generally, may encourage them to produce a more constant level of enlistments over time…Shortening the cycle may have…a beneficial effect since the amount of time that productivity is lower is less when the cycle is shorter…Shortening the production cycle would limit the extent of the problem (reduced productivity at the end of the recruiting tour) because recruiters would be in this situation less often (for a shorter period of time). (Asch, 1990)

The resulting impact of these perceived shortcomings in the incentive system is to call into question, once again, the quality of the production variables used in supply models for the assignment of recruiting goals. While it seems likely that, in the end, the rotation of personnel in and out of the system would average itself out, this cannot be assured. In some instances, it is highly likely that an area, particularly at the station and zone level, could be greatly affected, either positively or negatively, by the shortcomings of ERIS. For this reason, care must be taken, particularly when regional and district commands are assigning recruitment goals. Placing too much emphasis on past production could ultimately result in the unintentional under- or over-assigning of goals.

Finally, one additional issue with the PPR calculation is the size of the DEP pool in recent years. In recent years, the Navy has built its DEP pool to nearly 70% of current FY accessions. This has not always been the case. As recent as the early 1990's, the Navy experienced DEP pools in the 25 to 35% range. As a result of increased DEP pool sizes in recent years, a significantly greater amount of time is being required of our recruiters today to manage these contracted recruits. As a result, the time available to each, on average, to actually spend in the "field" recruiting has been reduced. This too,

has certainly had a negative impact on the PPR number, with little evidence of decreased recruiter productivity, effort, or workload.

D.   CHAPTER SUMMARY

Commander, Navy Recruiting Command is charged with recruiting the young men and women who will man our Naval Forces for years to come and fighting for the resources to do so. Recruiting during the AVF years has seen its ups and downs and will undoubtedly continue to do so in the years ahead. Regardless of the challenges faced by the recruiting community, high quality youth will surely remain the primary target group for manning our ranks.

Although countless studies have been conducted in the past, in an effort to better understand the factors that most affect the recruitment of youth and to aid in the prediction of attaining high quality youth, it is important that we continually strive to gain additional insight into youth trends and attitudes and the factors which motivate their feelings toward serving in the armed forces. Doing so will undoubtedly aid the recruiting efforts of the future.

A-cell recruits have shown themselves to be the most desirable target group for the all military services. They have proven to be most likely to complete their enlistments, have the lowest training costs, the fewest disciplinary problems, and have shown the best overall career performance. They are, however, the toughest and most expensive to recruit. We must therefore, continue to work to understand and meet their needs if we are to continue to be successful in recruiting these highly desirable youth. As much as we desire A-cell recruits, we will always require and desire recruits falling into lower TSC groups. We must then also strive to ensure that we are meeting the needs of those in these lower TSC groups and continually work to improve the likelihood of their success.

CNRC utilizes an Enlisted Goaling and Forecasting model, as well as other techniques, to establish recruiting goals to insure that current and future accession requirements are met. Assigning NCO and controlling DEP size are the primary means to assure accession success. Navy recruiting Regions are goaled by CNRC and are

responsible for making their share of the recruiting mission through management of subordinate NRDs.

Numerous factors, such as pay, unemployment, recruiters, bonuses, advertising, recruiter productivity, and various populations have a large impact on the Navy's recruiting success. Just as important, however, is the propensity of today's youth (primarily their views toward military and in particular, naval service) for naval service. How well the Navy understands each of these factors and how these factors have changed over the years and how they will likely change in future years, will be the determining factor in whether the Navy is able to continue its successful recruiting efforts.

The recruiting of today's young men and women is as vital to the future success of today's Navy as it has ever been. Understanding the process the Navy uses to gather multiple sources of information and the use of this information to effectively goal the recruiting community based on past, current, and future data will hopefully aid in the overall effectiveness of recruiting efforts and have a positive effect on the overall understanding of this process. In providing this understanding, it is believed that the "buy-in" for this process will improve throughout the recruiting organization.

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III.   COMMANDER, NAVY RECRUITING COMMAND ENLISTED GOALING AND FORECASTING MODEL

A.   PURPOSE OF THE MODEL

The primary purpose of CNRC's goaling model is, "to predict the supply of male, NPS, HSDG, category I-IIIA (A-cell) recruits and to allocate enlisted new contract goals to Regions in a fair and impartial manner." (Enlisted & Officer Goaling Models CNRC Briefing, January, 2005) While the goaling model is not the only method of assigning goal shares amongst the Regions, its use provides the best possible estimates, given available data to formulate and distribute goal shares. These goal shares are intended to aid in achieving the overriding purpose of the recruiting organizations efforts -- to meet accession goals. The goaling model can also useful in a number of other areas.

First, as was previously mentioned, the goaling model can be used as a signaling tool. The early projections of the model can be used to determine the likelihood of achieving recruiting success for the year ahead, particularly in the area of male, high quality recruits. This allows CNRC and the Navy to react proactively to take the actions necessary to improve the chances of meeting recruiting objectives, particularly when the model forecasts significant shortfalls.

The goaling model also serves as a formal tool in the assignment of recruiting goals. Could the Navy get by without using a goaling model and simply assign goals based on past performance? They probably could. Would the recruiting community be as effective in providing new contracts and accessions which are so vital to the Navy's continued success? This is doubtful. The use of the goaling model provides an estimate of the recruiting capacity of a recruiting District. This insures that while past production is included in the model, it is not the overriding factor. This is important because a recruiter's tour of duty is typically three years. Recruiters are consistently rotating in and out of their recruiting tours. Recruiter rotation can have a large impact on an area's ability to recruit. Experienced recruiters rotating out of their recruiting assignments will negatively impact an area's ability to recruit. If the primary method of determining goals was based solely on past performance, an area which performed extremely well during one period (FY) would see their goals increased in the future, based on their previous

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success. When these experienced recruiters rotate out of their current assignment, this system would assign very high goals to the area even though they were now staffed with very junior and inexperienced recruiters. This could potentially set an area up for failure. For this reason, the current goaling model is important, because it goals areas based on all the factors that go into predicting the future success of these areas (NRDs). The model, in effect, limits the fluctuations based on past performance due in large part to prior recruiter effectiveness. This ensures that goals are more or less, impartial and fair, as well as ensuring that goal is based on the true market potential of an area. In the end, CNRC's goaling model limits the negative effect that past poor performance will have on reducing goal shares, as well as the equally negative effect of limiting increased goal shares for those exhibiting superior performance. Here, we can see how the use of the goaling model can motivate recruiting performance. Recruiting Regions and Districts can feel comfortable that the goals they are receiving are based on the best possible information and calculated using recognized statistical techniques to accurately reflect the true potential of the markets in which they are operating.

Another important factor in assigning goals is that they provide motivation. The assignment of goals at every level in the recruiting organization, down to the individual recruiter, provides motivation for achievement throughout the organization. Ultimately, everyone wants to succeed. Taking into account the mass of information used in the model, provides a level of credibility to the goaling assignment process. Those who are ultimately assigned goals can be sure that they are receiving their "fair share" and are on a level playing field with the rest of the recruiting community. In a sense, it ensures a healthy level of competition within the recruiting organization, whether it is amongst Regions, NRDs, or individual recruiters.

Finally, another important purpose of the model is, "to make assigned goals believable and understandable." (Sladyk, 2004) Most within the recruiting community are generally not well versed as to the inner-workings of statistics and econometrics. This occurs because many of those who typically conduct goaling efforts within the recruiting organization are long-term civilian employees who are experts in their field. Conversely, many of those who view the model's output and ultimately must make decisions based on its information are active duty military personnel. The majority of

these military personnel come from varying backgrounds within the Navy, having only a general understanding of these goaling processes. The model therefore, must present itself in a believable and understandable manner. While most will not understand every aspect of how the numbers are generated, if the model incorporates factors (variables) which are understandable and reasonable in explaining why changes in goaling numbers have taken place, the buy-in to the model's output will be enhanced. The model performs this function reasonably well.

B. CNRC ENLISTED SUPPLY MODEL

The CNRC Enlisted Supply Model is an econometric supply model used to predict the supply of net new contracts across the 31 Navy Recruiting Districts nationwide. The model uses a wide array of factors covering current and past events, such as previous recruiting success, economic conditions, recruiting resources, and demographic shifts in the population, to ultimately predict how each of the NRDs will perform in the future, specifically the next four recruiting quarters. As described by Dan Goldhaber (1999) these predictions serve:

> (1) as a means of providing warnings of recruiting difficulties so that additional resources, if necessary, can be provided to achieve a specified goal, and (2) to allocate overall navy recruiting goals across Navy Recruiting Districts (NRDs) in a way that is fair, given demographic differences between NRDs. (Goldhaber, 1999)

While an actual evaluation of the specification of the model will not be performed for this thesis, an understanding of the variables that make up the model itself is important. The purpose here is not to re-invent the model. Instead, the purpose will be to gain an understanding of all the factors that make up the current CNRC model, which if any factors are not included that should be, and how the distribution of new contract and accession goals is based on the model. Once these areas are understood, it will aid in any future work involving possible changes or improvements to the model itself.

1. Goaling Model Variables

The following section provides a clear understanding of the variables that make up the goaling model itself. Table 1 shows the FY05 CNRC Enlisted Goaling and Forecasting Model Regression Results. Variables in the goaling and forecasting model are in log-log form thus, for each of the variables discussed below, Table 1 provides,

"Coefficients that can be interpreted as economic elasticities – 10% change results in X% change in forecasted contracts." (Enlisted & Officer Goaling Models CNRC Briefing, January, 2005)

a. Dependent Variable and Sample

The dependent variable in the model is the number of *net new contracts* for male, HSDG I-IIIA (A-cell) recruits for each of the 31 NRDs by quarter. The pooled time-series cross sectional sample consists of observations on 31 NRDs by quarter for typically five to seven years. The most recent model reviewed for this thesis covered the fiscal year 1995, quarter 1 to fiscal year 2004, quarter 3 and contained 1,178 observations. (Sladyk, 2005)

b. Independent (Explanatory) Variables

(1) Production Recruiters in each NRD. As has been shown in nearly every study conducted in the area of predicting recruit supply, the number of recruiters is critical. Recruiters are the recruiting command's number one resource for contracting and accessing new recruits. Holding constant goal and effort, a larger number of recruiters will positively affect the number of high quality recruits an area produces. Therefore, the expected number of recruiters plays a significant role in predicting future contracts.

(2) Male, HSDG, TSC I-IIIA (A-cell) Population. This variable captures the population of males, ages 17 to 22, who are in high school or are high school graduates, and who have scored at or above the 50th percentile on the AFQT. This population represents the prime recruiting market for the military and is based on the available population meeting these criteria for the 31 NRDs, which is derived from U. S. Census Bureau population data at the zip code level. A higher male, HSDG, TSC I-IIIA population number will positively impact the number of high quality contracts a NRD can produce.

(3) Advertising Dollars. This variable accounts for national advertising dollars spent by the Army and Navy on an annual basis. This number is not broken down based on actual Regional or District advertising dollars spent and is thus, a constant value across all 31 NRDs. While the impact of advertising dollars is not as

strong as that of recruiters, for example, it generally exhibits a positive impact on the number of high quality contracts.

(4) Enlisted Bonuses. This variable refers to the average spending on enlistment bonuses on an annual basis (fiscal year) to entice new recruits to sign new contracts. A larger number of bonus dollars spent is expected to result in a greater number of net, new, high quality contracts. Enlisted bonus dollars generally show about the same positive impact on the recruitment of high quality candidates as that of advertising.

(5) Unemployment Rate. The unadjusted seasonal unemployment rate for each of the NRDs is factored into the model. Unemployment rates at the county level are aggregated to generate the unemployment rate for each of the 31 NRDs (each NRD contains roughly 100 counties, on average). As was mentioned in previous studies, the unemployment rate is vital in determining high quality male contracts. The higher the civilian unemployment rate, the more difficult it is for young people to find civilian jobs and the more attractive the military becomes.

(6) Military to Civilian Pay Ratio. This ratio, which varies across all NRDs, is constructed by dividing the average annual military wage rate for E-1 and E-2 military members in their first year of naval service by average civilian youth earnings for males, ages 18 to 25 in the manufacturing sector, by District. This variable includes only basic pay and allowances for the military service member and does not account for other non-monetary benefits, such as medical and dental. The reasoning here, is that non-monetary benefits received by young service members, such as medical and dental, do not significantly affect the decisions of youth to join the military when compared to base pay. Relative pay generally proves to be a very important factor in determining high quality male recruits and is calculated as a separate variable for each of the 31 NRDs.

(7) Male, HSDG, TSC 3B (Cu-cell) Population. This variable captures the actual population of males, ages 17 to 22, who are high school seniors or graduates and have scored between the 35th and 49th percentile on the AFQT. This number is based on the available population meeting these criteria for each of the 31 NRDs. Again, this is a highly recruitable population and this variable represents one segment of the recruiting market. The model does not include this segment in its forecast

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contracts, however. Thus, a higher TSC 3B population will negatively impact the number of high quality contracts an area can produce. In recent years, this population variable has shown to have the largest negative impact on forecast new contracts within a NRD.

(8) Veteran Population. This variable captures the population, within each of the 31 NRDs, that is currently on, or that has previously served on active duty in the armed forces. The veteran population is assumed to be a positive influencer of youth, thus a higher veteran population will positively impact a NRDs ability to contract high quality youth. Again, this data is derived by aggregating from zip code-level population data obtained from the U.S. Census Bureau.

(9) Delayed Entry Program. This variable reflects total DEP size for each of the 31 NRDs. Including the DEP size at the NRD level provides a level of indication for potential recruiting success for an NRD. According to N511, there are two concerns with DEP size that this variable is attempting to capture:

> First, if the DEP is too low, there will be pressure on recruiters to meet monthly goals if they have not already been previously filled. Second, if the DEP is too high, excessive recruiter time will be required to manage the DEP. With a very large DEP there is an additional concern that qualified candidates for enlistment will be required to spend significant times in the DEP waiting to ship that may lead to a change-of-heart for military service or cause them to seek enlistment in a competing service. (Sladyk, 2005)

A larger DEP size in an NRD has generally shown to have a negative impact on predicted net new male A-cell contracts an NRD can achieve, which suggests that the latter problems dominate the former.

(10) Patriotism/Retention. This variable captures the actions of those currently serving on active duty.

> "It consists of a dummy variable (0,1 value) for each of the 31 NRDs, that provides a measure of the impact that current retention rates will have on future recruiting success. It was added in an attempt to capture the potential effects of the September 11, 2001 disaster. For the FY05 goaling and forecasting model, this variable had a value of "0" for all years prior to 2002 and a value of "1" for the years 2002 through 2004, for each NRD." (Sladyk, 2005)

High retention rates are believed to reflect positively on naval service and the desirability to serve, and therefore positively affect the number of net new contracts that can be obtained. High patriotism/retention, while not displaying a particularly large impact on net new contracts, has shown to contribute positively to the model.

(11) Historical New Contract Objective (NCO). This variable captures the NCO previously assigned to each of the 31 NRDs. The variable is measured as a four-quarter lag in order to capture the impact of previous FY quarter NCO. This variable attempts to determine how previous NCO goal affects future forecasted goals over similar quarters in future years and has proven to have only a small, but positive, impact on high quality contracts within a NRD.

(12) DoD Recruiters. This variable represents the number of recruiters on active duty for the other three branches of service (Army, Air Force, and Marines) and is held constant for a given fiscal year across all 31 NRDs. DoD Recruiters have shown to have a minimal effect on the production of high quality male contracts. This variable has normally been seen as positive in the model. It has also been found to be negative at times, both in the model and in previous studies.

(13) Quarterly Effect. Seasonal effects are captured through the use of dummy variables in the model (Qtr 1 denotes Oct/Nov/Dec, etc.). The use of these dummy variables is meant to capture seasonal recruiting differences throughout the year. Typically, recruiting efforts are most successful during the months of June though November. As such, the 4th quarter is typically the strongest recruiting quarter of the year, while the 2nd quarter is the weakest. These effects can also be seen in the N13 Accession Implementation Plan which calls for a total of 8,116, 6,727, 8,710, and 14,947 recruits during the FY05 recruiting year for quarters 1, 2, 3, and 4, respectively. These dummy variables capture these quarterly effects and with Q4 generally acting as the reference quarter, the coefficient of these variables is expected to be negative.

2. Type of Model Used

The CNRC male, A-cell supply model is estimated using a fixed effect, autoregressive estimator. The fixed effect classification for the model captures the NRD fixed effects. The fixed effects approach, "assumes that differences across units (in this

case, NRDs) can be captured in differences in the constant term of the model." (Greene, 2000) Thus, each NRD effect is an unknown parameter to be estimated.

> "It is assumed that the intercept varies across the cross-sectional units (NRDs) and/or across time periods...The dummy variable coefficients reflect ignorance – they are inserted merely for the purpose of measuring shifts in the regression line arising from unknown variables." (Kennedy, 1998)

Thus, the use of fixed effects, attempts to account for differences across NRDs, resulting from unknown factors, such as propensity and patriotism.

Autoregression is defined as, "using a lagged value of the dependent variable as an independent variable." (Kennedy, 1998) The autoregressive form of the supply model occurs due to the use of Historical New Contract Objective (NCO) as an independent variable. Historical NCO is a lagged value of New Contract Objective, the dependent variable in the model. The autoregressive process results in a, "time series model whose current value depends linearly on its most recent values plus an unpredictable disturbance." (Wooldridge, 2003)

3. Primary Factors in the Model

As has been shown in most previous enlistment supply studies, the most important factors in predicting the future supply of new contracts in CNRC's Enlisted Goaling and Forecasting Model are male high quality and low quality populations, recruiters, the unemployment rate, and relative earnings. To a lesser extent, veteran populations, advertising dollars, and enlisted bonuses have also been found to aid in predicting new contracts.

The impact that each of these factors has on the model and its output, varies slightly from year to year. However, there is little doubt that the supply of new contracts for the Navy is driven by a significant number of factors, primarily demographic, economic and recruiting resources. While the impact of these factors may have changed slightly over the years and will likely continue to change in the future, these are sure to remain the driving forces behind youth intentions to enter military service. Table 1 provides the FY05 CNRC Enlisted Goaling and Forecasting Model regression results, to aid in the discussion that follows.

Table 1.   FY05 CNRC Enlisted Goaling and Forecasting Model Regression Results

Factor	Coefficient (b)	Standard Error (STDE)	b/STDE	P[│Z│> z]
Recruiters	0.371	0.051	7.263	0.000
Male, HSDG TSC 1-3A Population	0.371	0.202	1.834	0.067
Relative Pay (Military/Civilian)	0.280	0.135	2.071	0.038
Unemployment Rate	0.274	0.042	6.578	0.000
Veteran Population	0.219	0.229	0.957	0.339
Advertising (Army & Navy)	0.150	0.100	1.506	0.132
Enlisted Bonus	0.136	0.096	1.422	0.155
Patriotism/Retention	0.085	0.028	3.067	0.002
Historical NCO (4-qtr lag)	0.078	0.038	2.043	0.041
Delayed Entry Program	0.046	0.036	1.282	0.200
DoD Recruiters	0.017	0.005	3.242	0.001
2nd Quarter	-0.096	0.012	-7.726	0.000
DEP – Higher Order Effect	-0.098	0.020	-4.960	0.000
3rd Quarter	-0.185	0.011	-17.352	0.000
1st Quarter	-0.213	0.016	-13.012	0.000
Male, HSDG TSC 3B Population	-0.365	0.346	-1.054	0.292
Autocorrelation Coefficient	0.228			
Number of Observations	1,178 (FY95Q1 to FY04Q3)			
R-squared	0.69			
Range of Fixed NRD Effects	-4.556 to -5.119			

Source: "Enlisted & Officer Goaling Models," CNRC Briefing, January, 2005.

It should be pointed out, that many of the variables in the Regression Results prove to be significant ($p \leq 0.10$). However, when viewing the coefficients for these significant variables, the relative importance to the prediction of net new male high quality contracts becomes apparent. For example, when comparing the coefficients of Recruiters (0.371) and DoD Recruiters (0.017), both highly significant variables,

Recruiters are shown to be nearly 22 times more important in predicting net new contracts for this high quality male population than are DoD Recruiters. Likewise, Recruiters and Male, HSDG TSC 1-3A Populations (both variables having coefficients of 0.371) can be compared to Patriotism/Retention and Historical NCO (coefficients of 0.085 and 0.078, respectively). Again, all variables are highly significant, however Recruiters and the male population variable are shown to be approximately 4.5 times as important in predicting net new male, NPS TSC 1-3A contracts.

a. Demographics

Demographics have, and will continue to play, a major role in recruiting for the Navy. Because the Navy recruits more than 80 percent of its enlisted ranks from the male population, the high quality male population will continue to be the primary target for recruiters. The Navy also will continue to recruit lower quality male recruits, as well as an increasing numbers of female recruits. However, as of now, the supply of these groups far exceeds the demands of the Navy. It is for this reason that the focus of the goaling model remains on high quality male contracts. For this reason, female populations are not included in the model. On the other hand, lower quality male populations are included in the model, because a larger Cu-cell population will invariably drive down the number of male A-cell recruits that can be obtained from a given area.

With respect to veteran population, a high veteran population has shown to increase the propensity of youth to enlist in the armed forces. While this certainly impacts the results of CNRC's forecasting model, analysts have pointed out future problems. Warner, Simon, and Payne pointed out the negative impacts of a decreasing veteran population in their 2003 study, as the percentage of recruits whose parents had prior military service had dropped from 49 percent in 1987 to 36 percent in 1997. Prior to the All-Volunteer Force (AVF), we saw large numbers of youth drafted into military service during times of conflict, which significantly increased veteran populations. Today, however, with a more technologically advanced military, we have been able to sustain the AVF with much smaller accessions so large influxes of veterans into our population no longer exist. This declining veteran population trend is sure to continue in future years as our military forces continue to shrink and older generations of military service members pass on. The impact of this trend on youth's propensity to enlist in

years to come should not be underestimated. The falling veteran populations also negatively affect the goaling model's performance. As this population is reduced, this variable we begin to explain less and less of the variation in new contracts across NRDs.

b. Economics

As in the past, the primary economic factors that will impact the supply of high quality recruits in the future will continue to be pay and unemployment rates. The military has been quite proactive in the area of military pay in recent times as it has attempted to close the military-civilian wage gap. These efforts will likely continue in the future. Unemployment Rates continue to be one of the driving factors in the enlistment of the youth population for military service. The Navy has experienced recruiting success during the early 2000's as unemployment rates climbed. This followed difficult recruiting years in the late 1990's when the civilian unemployment rate was low. As, economic conditions have continued to improve in the U. S. since 2003, we have seen a steady decline in the unemployment rate. This unemployment rate trend should not be taken lightly, as it is sure to signal more difficult recruiting times ahead.

c. Recruiting Resources

Recruiters continue to be the number one recruiting resource available to the Navy for obtaining high quality contracts. This is also the toughest resource at the Navy's disposal to manipulate. As Goldberg (1983) and 20 years later, Warner, Simon and Payne (2003) both agreed, recruiters are vital to the successful recruiting of high quality youth. They also agreed, however, that recruiters were one of the most costly means by which we can increase high quality recruiting.

During successful periods of recruiting, as we have experienced in recent years, and under continual pressure to reduce costs, it is easy to see why there has been pressure to reduce the number of Navy recruiters. Caution should be taken, however. As described in Chapter II, section C.4, the size of the recruiter population is not necessarily easy to manipulate. Reducing the size of the recruiting force too much, coupled with increasingly difficult recruiting times in the future, could again lead to shortfalls in recruiting and the missing of accession goals.

As was the case in previous studies, advertising and bonuses are also important to attracting high quality male recruits. As mentioned, the impact of these two

variables in the CNRC model is essentially the same. As was shown in previous studies, however, advertising can be an effective tool at CNRC's disposal when recruiting shortfalls are anticipated. Bonuses, on the other hand, while quite expensive on average, serve largely as a "skill and term-channeling tool" (Warner, Simon, and Payne, 2003) for the Navy. While there is significant cost associated with enlistment bonuses, across the board, the Navy may be forced to enhance their enlistment bonuses in response to the Army and Marine Corps' efforts to deal with current recruiting difficulties.

With regards to advertising, Goldhaber (1999) recommended that CNRC drop advertising from its enlistment supply model. To date, this recommendation has not been followed. While the advertising variable has not always shown itself to be significant in CNRC's model and questions remain as to whether advertising actually drives supply or supply drives advertising, the advertising variable provides a useful function in the model. First, the results provided for the advertising variable in the model can provide some indication to the recruiting organization as to the effectiveness of advertising and the impact of changes in its advertising strategy. Second, as was mentioned in Chapter III.A, the model must be believable and understandable. The advertising variable provides a useful means for accomplishing both of these objectives. While these are certainly secondary objectives of the model, they are met nonetheless with little effort and no negative impact on the model itself.

4. Difficulties with the Model

As was previously mentioned, Goldhaber (1999) concluded that while the model could be slightly improved through modified and additional variables, the predictive power of the model in its present form is actually very good. We should not rest on previous studies, however. We must continually attempt to identify factors which most influence the supply of enlisted recruits and make all reasonable efforts to ensure they are properly captured in the model. Only then, can we be sure that the Navy's enlisted supply model is the best predictor of contracts. The intention here is not to attempt to replicate the CNRC goaling model as was done in Goldhaber (1999). Instead, the purpose of this section is to point out some of the areas in which the variables of the model could potentially be modified and improved, so that they more accurately reflect the factor or condition they are attempting to capture. It should be noted, however, that

while variables mentioned below and possible solutions have been identified, a realistic solution is not always achievable or even economically feasible.

a. *Advertising Dollars*

The advertising variable is believed to be a contributing factor to the recruiting success of the Navy. It makes sense that the more the Navy advertises the more recruits it should be able to reach and motivate to enlist. A number of studies have been completed solely on the impact of advertising on recruiting. Most agree that the advertising impact is positive. Its impact on the enlisted goaling model is relatively small, however, and as previously mentioned, this impact is generally, but not always, positive. As mentioned in Chapter II, Goldhaber (1999) recommended dropping the advertising variable from the CNRC model. Essentially, Goldhaber concluded that instead of advertising dollars being a predictor of the future supply of enlisted recruits, the number of recruits previously recruited, was likely a determining factor in what advertising expenditures would be in subsequent recruiting years. As mentioned, the advertising variable is not always positive in the goaling model. This is likely to be the case in the years ahead as the Navy continues to increases it's advertising spending, while accessions remain relatively constant and well below the accession numbers of years past.

The difficulty with removing the advertising variable from the goaling model is that it is one of the few measures of the impact of advertising spending. While it generally exhibits a positive effect, it is rarely significant in the goaling model output. In the end, while it does not generally help much in the prediction of high quality contracts across NRDs (it only slightly increase the models R^2), according to CNRC, it is also not believed to cause significant negative affects to the model in the way of increased multicollinearity or standard errors. The fact that advertising is in the model seems to have more to do with making the model believable than anything else. However, variables are not required to be significant to be included in the model and the cause for the apparent small effect of the advertising variable could be due to collinearity. For this reason, there seems to be little reason to remove it from the model. This variable could potentially be improved with regional advertising expenditures, if such data could be collected at low cost.

b.   *Enlisted Bonuses*

Enlisted bonuses act in much the same as advertising dollars in the goaling model. The impact of enlisted bonus dollars is generally positive, but not generally significant. As with advertising, enlisted bonus dollars seem to be very reactive to past recruiting successes. If the Navy fails to achieve its recruiting mission for a particular program, such as Nuclear Program enlisted recruits, the Navy is likely to increase targeted bonuses to this field only. Thus, bonuses depend on past successes, instead of being predictive of future contracting success. The bonus variable, acts in much the same way as advertising in that, it does not generally add significantly to the model, but does not necessarily hurt it either. For the same reasons listed above, it is recommended that bonus dollars be retained for use in the model.

c.   *Relative Military to Civilian Pay*

Relative military to civilian pay is one of the most predictive variables in the goaling model when viewing model coefficients, and is usually highly significant. The problem with the relative pay variable is not with the way the measure is calculated, but rather the numbers that are used in the calculations. The first of these numbers, Navy pay (numerator), is based on the average pay of an enlisted recruit in his first year of enlisted service. This is an average of E-1 and E-2 basic pay for an enlisted sailor with less than 2 yrs of service. The potential fault in this number is that it may underestimate actual entry pay. The average of E-1 and E-2 pay, which makes up the military pay portion of the relative pay calculation, makes a crucial assumption. It assumes that every recruit entering recruit training, does so at a paygrade of E-1. In-fact, a significant number of recruits enter the naval service at the paygrade of E-2 or E-3. In order for the Navy pay variable in this relative pay calculation to be as accurate as possible, it is necessary to determine the percentages of those entering naval service as an E-1's, E-2's, and E-3's. Once these percentages are determined, a much more accurate figure for the military pay portion of the relative pay variable can be calculated, using a weighted pay variable that is based on the percentage of new recruits entering each paygrade.

The second number used to determine the relative pay variable is civilian pay (denominator). This number represents the average pay for the 18 - 25 year old manufacturing workers, across NRDs. The problem with this number is that it provides

an average salary for workers in the 18 - 25 year old working population, when the primary target population for the Navy is 17 - 22 year olds. The result is undoubtedly a civilian average pay that is higher than the actual civilian pay for the "true" intended target group. A more accurate measure of civilian pay would capture only those in the target group (age 17 - 22).

The overall effect on the military to civilian pay variable of the two issues outlined above is that the ratio, used to define this variable for each of the 31 NRDs is likely unintentionally biased and understated. The numerator in this case, military pay, is very likely understated in that a significant number of recruits enter military service at a paygrade of E-2 and E-3, which would drive the military pay number higher. This is particularly true considering most of those entering military service at an increased paygrade will be high quality recruits, precisely what the model is attempting to predict. The denominator in this case is probably overstated due to the inclusion of 23 – 25 year olds, who for no other reason than increased tenure are likely to have a higher wage than those in the actual target group. Thus, the actual wage of those the Navy is targeting is likely lower than the values currently being utilized. Improved numbers in each case, resulting in a larger numerator and smaller denominator for this pay variable would likely cause this pay ratio to increase. The result would be a military to civilian pay ratio that more accurately represents what the ratio was designed to capture.

Improved accuracy of the military-civilian pay variable could potentially improve the model's predictive capability, as well as provide a more precise measure of elasticity. The end result is two-fold. First, an increase in the predictive capability would allow for more accurate forecasts across NRDs. Second, while a military pay raise is not generally viewed as a realistic option to make up for shortfalls in forecasted recruits, particularly short-term, a more accurate measure of elasticity would allow for a more accurate assessment of such an increase by Navy leadership.

While the above changes to the relative pay variable would certainly improve its model's predictive capacity, the difficulty is obtaining the information to do so. Percentages for those entering military service as E-1's, E-2's, and E-3's could seemingly be obtained without too much difficulty through the Defense Management

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Data Center (DMDC). Unfortunately, civilian pay for those in the 17 - 22 year old age group is not as easily obtained. The civilian wage data currently available to CNRC however, is for that of 17 – 25 year olds. The added cost of obtaining such info could prove to be prohibitive, but should be explored nonetheless. Interpolated civilian pay figures for this age group (17 – 21 year old males) might be considered as a possible alternative to high cost data.

d.   *Veteran Population*

Veteran population has proven to be an important factor in the goaling model, but it is not generally statistically significant. This is very likely due to the fact that with decreasing recruiting goals in recent years, the recruiting of male, A-cell recruits has not been purely supply-driven. In-fact, to some degree, male A-cell recruiting has possibly bordered on demand-driven during the early 2000's. Although, the veteran population variable has not shown itself to be particularly predictive in the model in recent years, it will likely continue to play a large role in determining the propensity of youth to enlist for those exposed to military veterans. Because of this, care should be taken not to underestimate the importance of veteran populations on future years recruiting efforts.

Conversely, as the services continue to decrease, as a whole, the veteran population in the U.S. is likely to continue to decline as a percentage of the population. This will likely have a negative impact on recruiting effectiveness and costs in the future. With respect to the goaling model however, as the veteran population declines, the impact is uncertain. While inclusion of the veteran population will undoubtedly increase the model's R^2 (predictive capability), the affect that decreased future veteran populations may have on multicollinearity and standard errors are unknown. Additionally, the impact that veterans have on the supply of net new male high quality contracts may not be linear. The reduced prevalence of military veterans in society, in future years, may result in what amounts to a structural shift in the veteran population variable. The resulting impact may be that in future recruiting years, veterans may prove to be less important in predicting the supply of net new contracts than they are today or have been in the past. At present however, it is recommended that veteran population be retained in the model.

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e.   Delayed Entry Program

As with Recruiter productivity discussed in Chapter II.C.4., the variable for the delayed entry program should be interpreted with caution. The DEP variable has not generally explained much in the way of recruit supply in the goaling model and has not normally shown itself to be statistically significant. In recent years, it has actually proven to be a negative factor on enlisted supply. There are a few possible explanations for this. First, a significantly high DEP pool in a given NRD may signal that the available recruits willing to sign up are already under contract. Second, it could mean that recruiters in areas with typically high DEP percentages are actually recruiting higher percentages of low quality recruits into the DEP, decreasing their efforts on recruiting high quality candidates. Finally, the size of the DEP is proportionate to the workload required to manage it. The greater the DEP size the more time required to manage it, resulting in a decreased amount of time spent canvassing for new recruits.

f.   Propensity to Enlist

Propensity to enlist, which may be the most important factor in determining the supply of high quality male recruits is no longer included in the model. The propensity measure used in the model, which was obtained from the YATS Survey, is no longer available. A number of the variables in the model may capture pieces of the propensity variable; however, no direct measure of propensity is now available, which may affect the predictive power of the model.

Numerous studies have been completed in recent years discussing youth attitudes and beliefs concerning military service. Nearly all have come to the same conclusion: propensity to enlist in the military services is on the decline and has been for some time (Warner, Simon, and Payne, 2003). This trend is not likely to reverse itself anytime soon. As mentioned earlier, a decreasing propensity to enlist has been reported as far back as the 1960's. A decreasing population of influencers (veterans) and an ever-increasing number of youth attending college will undoubtedly make the recruitment of the most desirable high-quality recruits an increasingly difficult challenge.

Figures 7 and 8 show the disparity in the number of recruits per state. Figure 7 provides an illustration of the total number of new military recruits broken down by state for 2002. Figure 8 shows the new military recruits for 2002 as a percentage of

the available youth population, ages 18 to 29 per state. Figure 8 clearly indicates the differences in the youth attitudes toward military service across regions of the country. Understanding these innate differences in the propensity of youth to enlist in the services will be critical to predicting the future supply of recruits and effectively goaling the Regions and NRDs. A measure to identify the propensity of youth should be identified and included in the goaling model. It is quite possible that recent recruiting successes have obscured the real necessity for this measure and that as time passes and recruiting once again become more difficult, the supply of high quality male recruits will again become supply driven. When this occurs, propensity will likely become a critical factor in accurately and fairly determining and assigning enlisted goals.

Figure 7.   Number of New Military Recruits Per State, 2002

Source: From Population Bulletin's "America's Military Population," December 2004.

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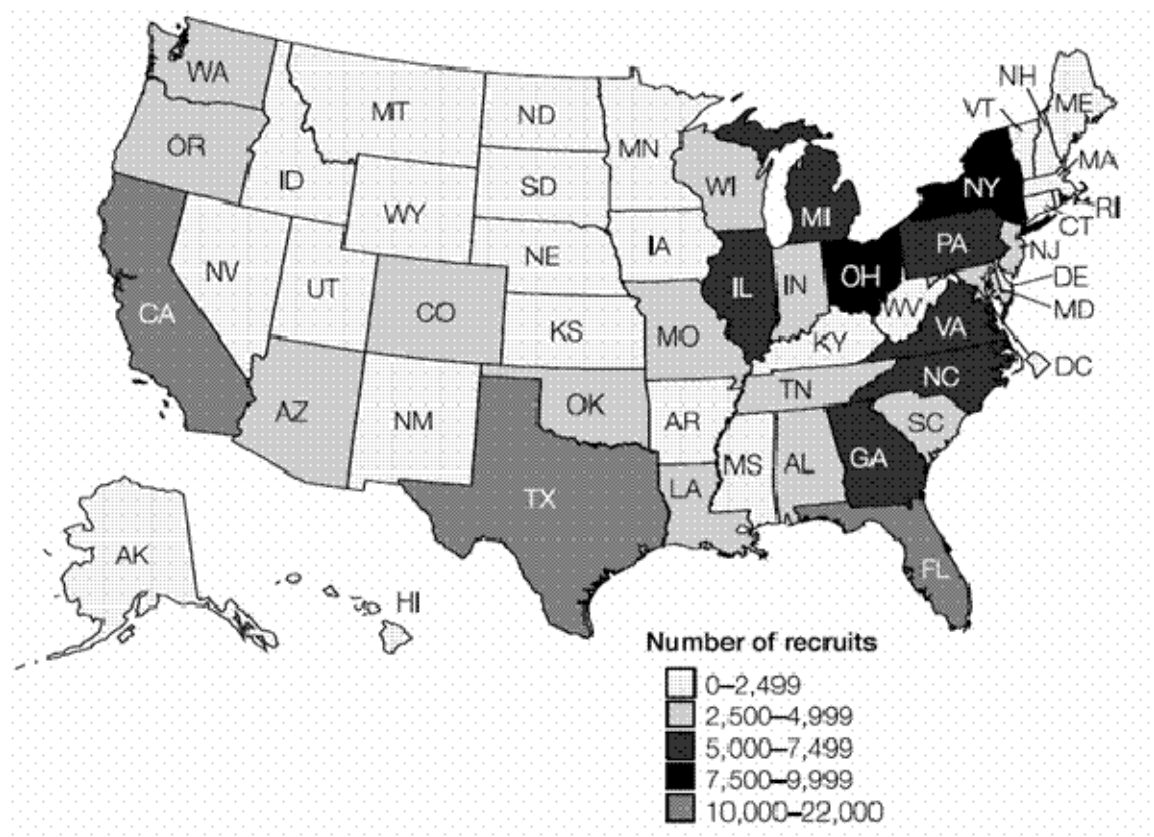
Figure 8.   New Military Recruits as a Percentage of Population (ages 18-29) Per
State, 2002
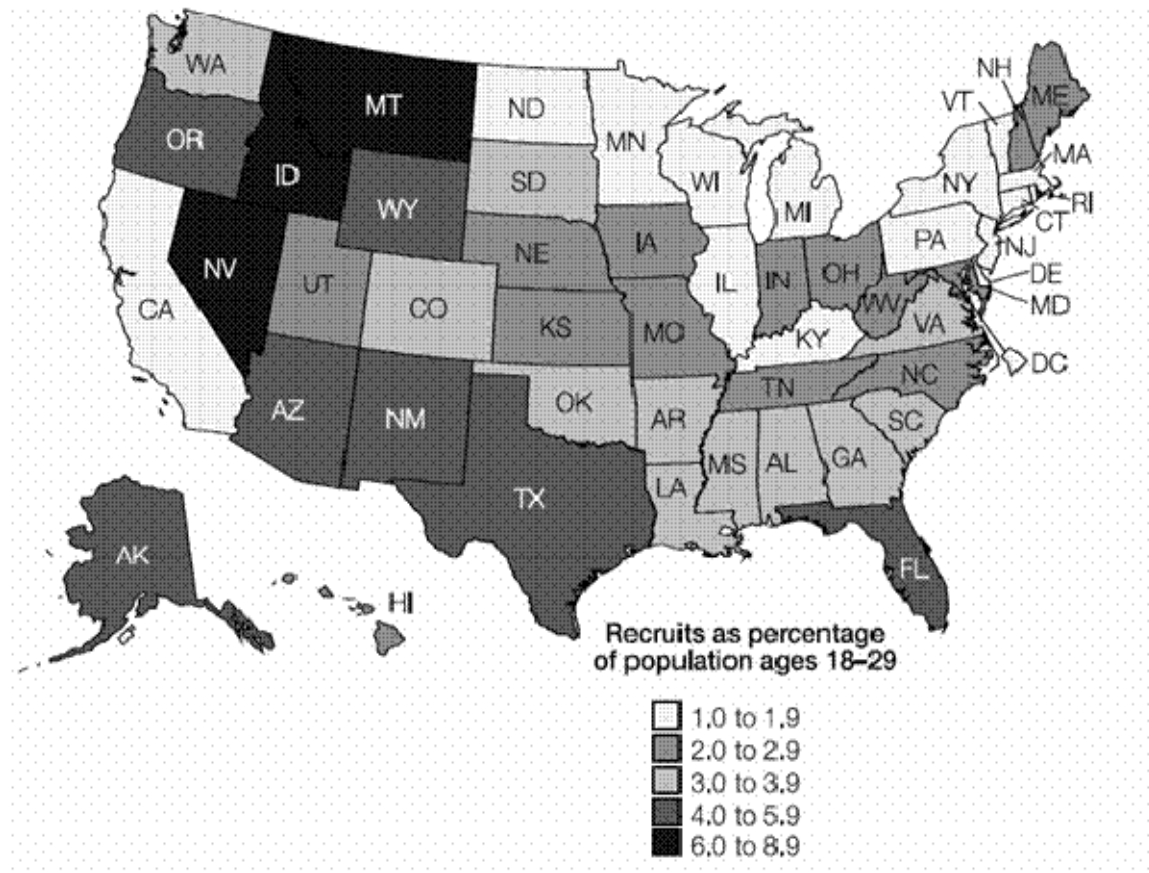
Source: From Population Bulletin's "America's Military Population," December 2004.

These figures clearly indicate the significant differences in the propensity of youth to enlist in the military based on geographical regions of the country. States such as New York, Michigan, Pennsylvania, Illinois, and California, all among the most populated states in the nation, provide some of the highest total number of recruits. However, these highly populated states ultimately prove to be some of the poorest performing states based on recruits per qualified population. The result is a much higher propensity to enlist for those in the Southern, Central Plains, and Mountain states, as compared to states located in the Northeast and on the West Coast (primarily California). The measure of propensity will thus likely be critical to properly forecasting new

contracts during recruiting periods in which the recruits are not as plentiful as they seem today.

C.   BREAKING DOWN ACCESSION REQUIREMENTS

As has been mentioned, the CNRC enlisted goaling and supply model is used to predict the supply of high-quality male recruits only by NRD. These figures are then compared to the number of high-quality accessions required of CNRC by N13 to determine how the current projected numbers for the upcoming year stack-up against current requirements. Director, Military Personnel Plans and Policy Division (N13) annually publishes the FY Enlisted Recruiting Goals and Policies, which provides national accession requirements and quality mix, which CNRC uses as a guideline in establishing current year recruiting goals. It is from these N13 accession guidelines that CNRC calculates the estimated number of high quality male recruits needed to meet established requirements. Once CNRC determines the number of high quality recruits required for the upcoming year, it can then compare the results of the goaling and forecasting model with requirements to determine whether current projections will meet current needs. It should be understood that this is in no way an exact science. Recruiting numbers will be likely be modified throughout the year, so an exact determination of male high quality recruits is not critical. Table 2 is provided as an example of how the overall fiscal year Navy accession number is broken down, in order to arrive at the required TSC I-IIIA population needed to meet fiscal year accession requirements. This is also the number which will be compared to goaling model forecasts to determine potential shortfalls. The example provided in Table 2 is based on initial FY05 N13 accession requirements of 38,500 new recruits, as outlined in the, "N13 Accession Implementation Plan." (Fiscal Year 2005 Enlisted Recruiting Goals and Policies)

1.   Prior Service

Each year the Navy accesses a number of recruits who have previously served on active military duty. While generally small (approximately 2.5% annually), these recruits must be removed from the overall accession numbers required for the upcoming FY, as the Navy's supply model is focused solely on predicting the supply of net new contracts for male high quality recruits with no prior service. Once prior service recruits are

removed from the equation, the resulting Non-Prior Service (NPS) recruits will become the focus of all remaining calculations.

Table 2.   Breaking Down Male, NPS, HSDG TSC I-IIIA Accession Requirements

_____

38,500	(Total Required FY Accessions)
-1,000	(Prior Service – NAVET/OSVET/Reserve Recalls)
37,500	(Required Non-Prior Service (NPS) Accessions)
-6,904	(NPS Female Accession Requirement)
30,596	(NPS Male Accession Requirement)
-10,097	(33% Cu-cell Accessions Allowed)
20,499	(Male, NPS, TSC I-IIIA accession Requirement)
-1,529	(5% Max Allowed, Male NHSDGs – also TSC I-IIIA)
18,970	(Total Male, NPS, HSDG, TSC I-IIIA Accession Requirements)

_____

Source: Based on interview with Mr. Rudy Sladyk, CNRC, September 2004.

2.   Female Recruits

The Navy accesses a significant number of female recruits each year. Female recruits have played an increasing role in the Navy in recent years and likely will continue to do so. Females are currently demand driven in their recruitment. However, as the number of females the Navy needs increases, some believe females will eventually become supply driven, if they already haven't. In other words, the supply of female recruits is greater than the demand the Navy currently has for them, thus the number of females who join the Navy is determined by demand. This is due to a number of factors, primarily related to the number of sea-going billets available to female recruits. As traditionally male dominated fields within the Navy are opened to females and berthing requirements onboard ships are improved to accommodate additional female sailors, the number of female recruits will likely continue to rise. Until then, while the number of female recruits desired is considerable (approximately 7,000 per year), the overall percentage of females recruited each year is still relatively small (approximately 19 percent) compared to their male counterparts. While similar quality requirements are required of males and females, females must be removed from the equation, so that

ultimately the number of high quality male recruits, who make up the majority of those the Navy will recruit can be predicted.

3. Non-High School Diploma Graduates

Non-High School Diploma Graduates (NHSDGs) are the next number to be calculated when determining the number of high quality males recruits the Navy will goal for accession. Following the removal of prior service and female recruits from the total number of required accessions, we are left with the number of males which should be accessed in order to meet N13 guidelines. These guidelines also stipulate the maximum allowed number of NHSDGs. Currently at 5 percent, this percentage will be applied to the remaining male recruits to determine the maximum number of male NHSDGs the Navy will accept. As was discussed in Chapter 2, NHSDGs make up the B-cell category of new recruits (shown in figure 2) and require a minimum AFQT score of 50 to qualify for naval service. In other words, all NHSDGs who qualify for naval service will fall into the Test Score Category I-IIIA (TSC I-IIIA). This is important because the minimum number of TSC I-IIIA contract requirements contains NHSDGs.

4. Cu-Cell

Cu-cell (TSC IIIB) recruits are determined from the same number of male contracts that is used to determine the number of NHSDGs that will be allowed. The percentage of Cu-cell recruits the Navy will accept is determined by subtracting the N13 requirement for TSC I-IIIA recruits from 1.0. For FY04, this requirement was 67 percent, thus the percentage of allowable male Cu-cell recruits was 33 percent. Applying this 33 percent to the number of male contracts remaining (after prior service and female contracts have been removed) yields the number of Cu-cell accessions the Navy will be required to attain. In actuality, since Cu-cell recruits are demand driven, this number represents the number of Cu-cell recruits the Navy will allow to serve.

Once Cu-cell accessions have been removed from the total remaining male accessions, the resulting number is that of non-prior service male, TSC I-IIIA required accessions. This number can also be achieved by simply multiplying the N13 minimum required TSC I-IIIA accessions (again, 67% in 2004) to the total required male, non-prior service accessions. Once this number is derived, the number of NHSDGs, who are also included in this figure must then be removed. Once this has been accomplished, the final

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resulting number will be that of non-prior service, male, HSDG, TSC I-IIIA required accessions. At this point, forecasted results provided by the goaling and forecasting model can then be compared to these required accessions to determine the anticipated recruiting outlook for the upcoming year.

D. APPLYING THE MODEL OUTPUT

1. Model Goal Share Percentages

The output from CNRC's goaling and forecasting model provides forecasted male, NPS, HSDG, TSC I-IIIA contracts for each of the 31 NRDs over the next four quarters of the upcoming fiscal year. These projected numbers are then aggregated to the Regional level. In other words, the forecasts for each of the NRDs within a Region are summed to achieve a total forecasted projection for the Region. This process is repeated for each of the four Regions. From these regional totals, a goal share percentage for each Region can be calculated by dividing individual Region forecasted contracts by the total forecasted contracts nationwide. These goal share percentages are then applied to N13 accession requirements and CNRC New Contract Objective (NCO) to determine the appropriate shares for each of the Regional Recruiting Commands.

2. The Rest of the Numbers

To this point, the focus has remained on determining how the number of male, NPS, HSDG, and TSC I-IIIA forecasted contracts numbers and percentages are based on the model. Goal share percentages are generated for a number of other categories of accessions and NCO, however. For example, goal share percentages for Females, African-Americans, Hispanics, Asian-Pacific Islanders (API), and prior service accessions must also be derived. This process relies much more heavily on past production data as well as projected recruiting resources. The assignment of targets numbers for African-American, Hispanics, and APIs is performed to ensure that diversity within the Navy is maintained. Minimum diversity goal shares for TSC I-IIIA are set for these populations groups based on historical production data and resemble, however these are only considered targets. Specific quotas for sub-group populations are not set, thus there is no limit on the number of recruits who can be contracted and accessed from any of these sub-groups.

In these cases, historical production data provides key information for the formation of recruiting goals. First, historical data can aid in the setting of proper TSC I-IIIA percentages for each of these sub-population groups. Second, historical data can greatly impact the goal share percentages which are assigned by Region for each of these subgroups. For example, the African-American population in the North and South Regions is much higher than in the Central and West Regions. Thus, the Northern and Southern Regional commands receive a higher percentage of this subgroup recruiting number. Likewise, the population of Hispanics and APIs in the West Regions is significantly higher than that of the other regions. As such, the West Recruiting Region will be goaled with a smaller percentage of African-American contracts and accessions, but a much larger percentage for Hispanics and APIs than the South for example. These goals are established in large part based on the populations available within each of the Districts for the subgroups mentioned as well as historical production.

3.   Model Elasticities

In addition to providing forecasted net new contracts for each of the 31 NRDs, the coefficients estimated from the enlisted goaling and forecasting model provide the elasticities of each of the variables in the model. Table 1 shows the elasticities for the variables used in the FY05 prediction model. These elasticities provide a measure of the impact of a change in each variable on the supply of net new contracts. While these elasticities can be useful to interpret how a percentage change in the number of recruiters or in advertising dollars, for example, might impact the net new contract numbers, these elasticities must be viewed cautiously. First, some of the variables in the model are not statistically significant. For example, five of the coefficients are insignificant in Table 1 (at the .10 level). Insignificant coefficients imply that these variables have no effect on new contracts. Second, it must be remembered that the goaling and forecasting model forecasts net new contracts for the male, NPS, TSC I-IIIA population only. While this is certainly the largest population group which the Navy recruits, over half of those goaled in 2004 (33% Cu-cell (TSC IIIB) and 19% Female) are not currently modeled by CNRC. These sub-groups of potential recruits may react quite differently to changes in the variables in the model. For example, enlistment bonuses and advertising will likely have a much lower effect on sub-group contracts than on high quality contracts. This does not

create a problem when viewing model elasticities and the potential impact to a change in one of the variables, as long as it is understood that these elasticities apply to only male high quality contracts.

The main value of the estimated elasticities is that they provide a starting point for determining which areas can be modified should the model predict net new contracts significantly out-of-line with current projected needs. Additionally, these elasticities can be monitored to ensure the output of the model is as expected and reasonable. Elasticities that are in-line with expectations (expectations obtained from previous years models, as well as previous studies) can provide validity to the model results. Should the model elasticities prove to be significantly different from previous yearly results or from previous studies, it can signal a problem with the model data and output, or it could signal changes in the way the way these individual factors are currently affecting the supply of new contracts.

E.   CHAPTER SUMMARY

CNRC uses an econometric goaling and supply model to predict the supply of male, NPS, HSDG, TSC I-IIIA net new contracts for the 31 NRDs. The model assists CNRC in, "fairly and impartially assigning recruiting goals to the four Navy Regional Recruiting Commands," (CNRC *PXO Brief,"* Briefing, August 2004) as well as providing the Regions with recommended goals for each of their NRDs. The model's output can also be useful in signaling recruiting difficulties in the near future. Finally, as the model is essentially a tool in determining the workload for each of the Regional commands, it must also be believable so that its predictions can be easily justified to Region and NRD commanders. This ensures a level of buy-in for those who must live with its output.

The model is an estimated fixed effect, autoregressive model. The dependent variable is the number of net new contracts for high quality male recruits in AFQT categories I-IIIA. The explanatory variables in the model are a collection of economic, demographic, and recruiting resource factors which are believed to affect recruiting and the propensity of high quality male youth to enlist in the naval service. CNRC's model is consistent with studies conducted throughout the All-Volunteer Force era, in that the

variables included are those that have had the greatest impact on predicting the supply of high quality recruits.

While the model is an overall effective tool in aiding the process of assigning new contract and accession goals to the Regions, it is not without its potential shortcomings. It includes a number of variables which seem to have little predictive power (such as advertising, bonus dollars spent, and male TSC 3B population), but are included primarily to make the model "believable." Still, others are included which capture useful information, but uses less than ideal measures. Improving the data used in the model however is subject to the availability and cost-effectiveness of obtaining more precise indicators.

In order to determine if the forecasts provided by the model will result in meeting the fiscal year needs as outlined by N13 guidance, CNRC must first break down the N13 accession requirements by removing prior service recruits, females, Cu-cell, and NHSDGs. CNRC is left with the number of male, NPS, HSDG, TSC I-IIIA recruits it will be required to attain. This number can then be compared to the goaling forecasts to determine if the current recruiting resources in place will meet the upcoming fiscal year's requirements.

In addition to the information gained from the goaling model, CNRC must also generate goal shares for Females, African-Americans, Hispanics, and Asian-Pacific Islanders. Much of this goaling is based on N13 requirements for the given fiscal year and recent historical recruiting data and trends. For each of these sub-groups, target goals are assigned for NCO and accessions and distributed to the Regions.

IV. ANALYSIS OF THE FORECAST ACCURACY OF CNRC'S CONTRACT FORECASTING MODEL

A. HOW ACCURATE ARE THE FORECASTS?

The simplest method for determining the predictive accuracy of CNRC's forecasts is to simply compare the forecasted projections with the actual numbers of new contracts obtained in past periods. Table 5 provides this information, along with the "Delta" between the forecasts and NCA. This delta is obtained by subtracting NCA from forecasts. The percent error is then calculated to determine the degree to which NCA differed from forecasts.

Table 3.   Enlisted Goaling Model Accuracy (Forecasts vs. New Contracts Attained)

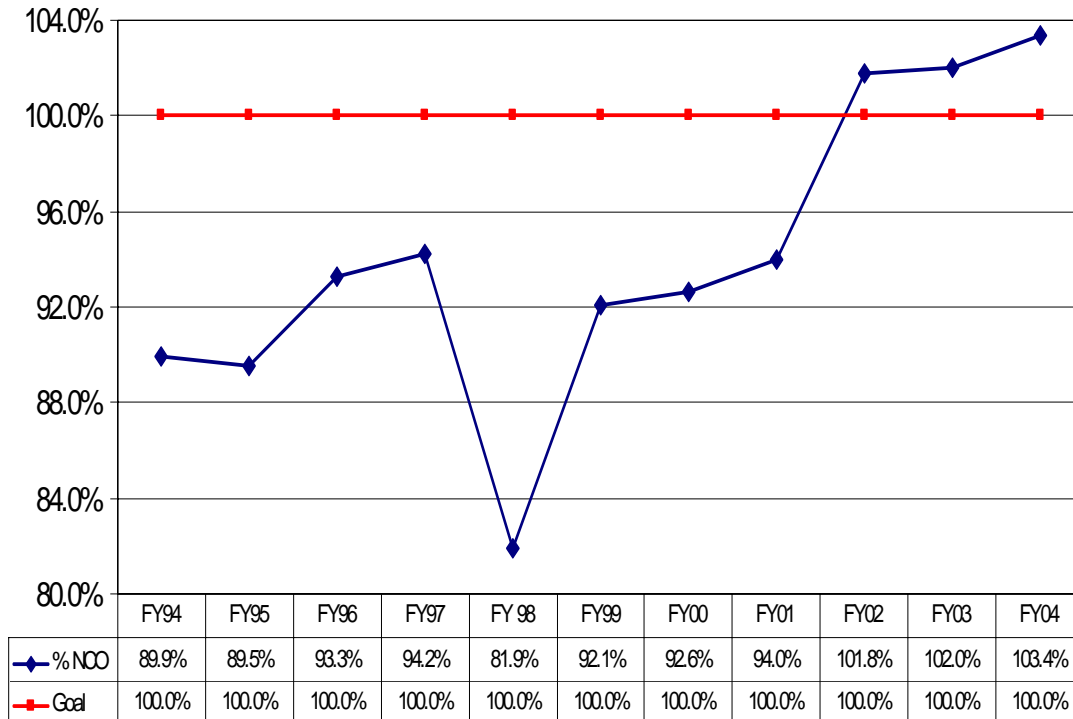| FY	Forecast	NCA	Delta	Percent Error	NCO
2004	44,382	42,175	2,207	4.97%	40,788
2003	47,800	41,642	6,158	12.88%	40,692
2002	55,900	53,080	2,820	5.04%	52,190
2001	56,253	55,098	1,155	2.05%	59,000
2000	56,971	56,469	502	0.88%	61,000
1999	48,273	53,504	-5,231	-10.84%	58,077
1998	47,528	44,458	3,070	6.46%	54,271
1997	48,559	44,538	4,021	8.28%	47,300
1996	53,466	50,659	2,807	5.25%	54,280
1995	52,872	51,229	1,643	3.11%	57,222
1994	50,013	50,242	-229	-0.46%	55,940
Average Absolute Error			2,713	5.31%	

Source: "Regression Coefficients Used in Enlisted Goaling Model," CNRC Briefing, April 2004.

As can be seen in Table 5, CNRC's forecasts have had an average annual (absolute) error of 2,713 new contracts since 1994, which translates into an average annual prediction error of 5.31%. Considering the many factors that play a role in determining the likelihood of youth to enlist that have been discussed throughout this thesis, an average annual error of 5.31% seems acceptable. There are, however, a number of factors that must be considered in order to provide a more precise interpretation of the model's forecasting accuracy.

In order to fully understand how the accuracy results in Table 5 are possibly misleading, the idea of new contract objective (NCO) must be revisited. NCO is the number of contracts the Navy would like its recruiters to write during the given FY and is based primarily on the needs of the Navy to meet accession goals and desired DEP size at the end of the recruiting period. NCO is also set completely independently of forecasts, which creates a problem when attempting to determine forecast accuracy numbers.

This difficulty stems from the fact that while recruiters make every effort to meet NCO, they are not be authorized to significantly exceed NCO. Exceeding NCO by a large amount could create problems with year-end DEP percentages and is therefore not allowed. In addition, recruiters have, for a number of reasons, failed to meet NCO. The reasons for failing to meet NCO are not important here. What is important here is that while NCO will never be significantly exceeded, there is no way to limit the amount by which recruiters will miss NCO. Recruiters will strive to do there best, given the recruiting assets at their disposal, but in the end nothing can prevent NCA from falling well short of NCO if the market is not sufficiently robust. This is further illustrated in Figure 10, which provides new contract attainment results since 1994 as a percentage of NCO. As can be seen, in the years when NCO was achieved, it was exceeded by no more than 3.4 percent. On the other hand, when recruiters were not able to meet NCO goals, the resulting shortfall was generally in the range of seven to nine percent, with the maximum shortfall occurring in 1998, when NCA fell shot of NCO by more than 18 percent.

Figure 9.   New Contract Attainment (As Percent of NCO)

	FY94	FY95	FY96	FY97	FY 98	FY99	FY00	FY01	FY02	FY03	FY04
%NCO	89.9%	89.5%	93.3%	94.2%	81.9%	92.1%	92.6%	94.0%	101.8%	102.0%	103.4%
Goal	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: "*Quarterly Recruiting Brief to CNP/CNRF*," CNRC Briefing, October 2004.

The resulting impact of this inability to significantly exceed NCO affects the NCA numbers obtained for the year and thus, the assessment of forecast accuracy. There are two situations which must be discussed in order to fully understand how NCO can negatively affect the predictive accuracy.

The first situation arises when NCO is set higher than forecasted contracts. In this situation it is assumed that recruiters will always do their best to achieve established goals and assuming that significant additional recruiting resources are not thrown into the equation, that the recruiting environment will be supply-constrained. In this situation, the comparison between NCA and forecasts provides an accurate assessment of forecast accuracy.

The second situation is one where NCO is set below forecasts. In this situation, the probability of achieving CNRC forecasts is essentially zero. Since 1994, NCO has

been set below forecasts four times. In all four years NCA fell short of forecasts; in two of those years, 1997 and 2003, the percentage by which NCA fell short of forecast was significantly higher than the average annual error over the observed time period, at 8.28% and 12.88%, respectively. The problem here is that, as mentioned above, regardless of where the NCO number is set in relation to forecasts, it will not be allowed to climb much higher than two to three percent above the established goal. It is not surprising then that during the four years which NCO was set below forecasts, NCA actually exceeded the NCO goal three times. In all four cases, however, NCA fell well short of forecasts. As a result, excessive forecast errors are almost forced into the system.

To correct for this problem, the years in which NCO is set below forecast must be excluded when evaluating forecast accuracy. Doing so allows for essentially unconstrained NCA results to be compared to forecasts, while excluding those NCA numbers which were essentially forced by NCO. Table 6 evaluates the accuracy of forecasts after removing the four years in which NCO was set below forecasts. After omitting the years in which NCA is essentially forced into a value that is well below that year's forecast, the average annual Delta (difference between forecast and NCA) is reduced from 2,713 to 2,091, and the average error falls from 5.31% to 4.01%, a reduction in the perceived error of these two measures of 22.9% and 24.4%, respectively, when compared to the results in Table 5.

Finally, one further modification to the forecast accuracy was made. In 1998 the Navy failed to achieve accession goals. Thus, in 1999 recruiter assets were significantly increased. In fact, recruiters rose from 3,170 in 1998 to 4,056 in 1999, an increase of nearly 28%. While this increase in recruiters was spread out over time and they were not necessarily all in-place at the beginning of the FY99 recruiting cycle, it is likely that the forecast number for 1999 was underestimated. The result was that although NCA fell short of NCO in 1999, NCA for the year was actually significantly above the forecast, the only year in which this occurred. For this reason, 1999 should also be excluded when evaluating predictive accuracy. The last row of Table 6 shows the average percent error falls to only 2.97% after removing 1999 from the sample.

Table 4.   Enlisted Goaling Model Accuracy (Forecasts vs. New Contracts Attained, For Years Where NCO > Forecast)

FY	Forecast	NCA	Delta	Percent Error	NCO
2001	56,253	55,098	1,155	2.05%	59,000
2000	56,971	56,469	502	0.88%	61,000
1999	48,273	53,504	-5,231	-10.84%	58,077
1998	47,528	44,458	3,070	6.46%	54,271
1996	53,466	50,659	2,807	5.25%	54,280
1995	52,872	51,229	1,643	3.11%	57,222
1994	50,013	50,242	-229	-0.46%	55,940
Average Absolute Error			2,091	4.01%	
Average Absolute Error (*excluding 1999*)			1,568	2.97%	

Source: Thesis author's calculation, based on "Regression Coefficients Used in Enlisted Goaling Model," CNRC Briefing, April 2004.

The end result of removing the years that do not accurately reflect either an unconstrained NCA or an accurate forecast, results in a reduction of the forecast-NCA Delta from 2,713 to 1,568 and a reduction in the average error from 5.31% to 2.97% (last row Table 6). This results in a decrease in the perceived Delta of 42.2% and a decrease in the perceived error of 44.1%. As a result, while CNRC's published forecast errors reflect positively on their ability to forecast new contracts, they appear to be a conservative assessment of the true predictive error of the forecasts. When the error calculations are performed using only the unrestricted years, which are the only numbers from which a "true" gage of how accurate CNRC forecasts can objectively be evaluated,

the predictive ability of CNRC to forecast net new contract numbers is significantly better than even they give themselves credit for.

B.   FUTURE CONCERNS FOR MODEL ACCURACY

Regardless of how you view the accuracy CNRC forecasts, they are quite good. Accurate forecasting in past years does not ensure accuracy in the future, however. Continual efforts must be made to improve the forecasting model to ensure that future forecasting success is as good as it has been in the past. To this end, CNRC continually strives to update the model to improve its accuracy.

As these continuous efforts take place, the following changes could be investigated as potential improvements in the model. Many of these items have been previously discussed throughout this thesis. Of course, the added benefit of any possible changes in CNRC's forecasting model must be weighed against the feasibility and cost of adding or improving the model.

1.   Advertising

As discussed, the advertising variable does not seem to improve model prediction in its current form. The advertising variable is measured only at the national level and does not vary across NRDs. If advertising spending were to be broken down, perhaps to the Regional level, the advertising variable would have greater variation and greater predictive power. Since advertising dollars are often focused in specific markets, capturing advertising dollars by Region, at a minimum, would allow for some of this difference in advertising expenditures across markets to be accounted for and possibly improve the goaling model's predictive capability.

2.   Relative Military/Civilian Pay

As described in Chapter III.B.4, the military/civilian pay ratio could be significantly improved, given the availability of improved data. Improvements could be made to the military pay portion of the variable (as discussed in Chapter II) at a relatively low cost, which quite possibly would improve the performance of this factor, as well as the overall performance of the model. Future researchers should investigate the availability of improved military and civilian wage data.

### 3.	Veteran Population

The high correlation between veteran population and the propensity of youth to join military service has been repeatedly shown through studies conducted during the AVF era.   Decreased veteran population numbers could potentially result in lower predictive capability of the model in future years if the variability of these numbers across regions is also reduced.   As a result, continued research must be conducted to determine the factors which most affect those in the target youth populations so that not only CNRC's goaling model, but recruiting efforts in general can be focused to meet these new demands.

### 4.	Improved Target Group Focus

In the previous CNA study (Goldhaber, 1999), the following results and conclusions were presented:

> We find we can better predict the subpopulations (workforce, high school senior, and category I and II recruits) using model specifications that do not restrict the coefficients to those of the A-cell model coefficients. We also conclude that the supply model of AFQT category I and II recruits is significantly different from that for A-cells.   When trying to make predictions about the subpopulations, we found that estimates from the subpopulation models significantly outperform predictions from the basic form of the A-cell model.   Of specific interest, we found that the supply model for workforce recruits is significantly different from the model for high school senior recruits. (Goldhaber, 1999)

These findings may prove valuable considering the smaller number of recruits and the increased percentages of high quality recruits that have been accessed in recent years.   An area of future research may involve, "the use of subpopulation models to better capture the effects of the predictor variables on the various subpopulations that fall within, for example, the TSC I-IIIA range." (Goldhaber, 1999)   This may result in not only improved accuracy of the forecasts, but also provide more meaningful elasticities of the effects of model variables on each sub-group.

### 5.	Propensity to Enlist

Currently, CNRC's model does not include a factor that captures the overall propensity to enlist of today's youth. For a number of reasons the propensity to enlist in the services, including the Navy, varies significantly across various regions of the country. This can be seen clearly by looking at Figures 7 and 8. Youth in Southern and

Mountain states clearly show a higher propensity to enlist than do those in the Northeast, Midwest, and West Coast states. An attempt to clearly capture this propensity and the reasons causing the disparity across the country (such as household income and college entrance rates for high school seniors) will go a long way in ensuring the future correct specification of the goaling model. The results of the 1999 CNA study, as well as the breakdown of the forecast accuracy numbers provided in Chapter V.A above, leave little doubt that the efforts made by CNRC to accurately forecast are on target. Continued improvements, however, are needed to insure future forecasts continue to remain effective.

C.   CHAPTER SUMMARY

The process of determining the accuracy of CNRC forecasts is generally conducted by calculating the simple forecast error for each fiscal year's forecast. In addition, an average error can be calculated to determine how forecasts have performed over time. As shown in Table 2, while the yearly error can vary significantly, given the current recruiting environment, the overall average error of CNRC forecasts is impressive.

In calculating forecast errors, however, the relationship of NCO to forecasts must be understood. When NCO is set below the yearly forecast, it becomes highly probable that NCA will meet or exceed NCO. It is also highly probable that NCA will fall short of forecast, virtually ensuring a significant yearly error. This is a result of limits placed on exceeding NCO.

Assuming outside influencers are not entered into the equation (such as significant additional recruiters) the most truly accurate measure of forecast accuracy would occur when NCO was set equal to forecasts. Since NCO is set based on the needs of the Navy and is set based primarily on accessions and DEP needs, we can only realistically obtain an accurate measure of forecast error when NCO is set above forecasts. In this situation, the system is supply constrained and NCA is not limited from exceeding forecast. It is only limited by NCO. This is not considered a problem for error calculations, however, considering not once in the 7 years since 1994 (shown in Table 3) in which NCO was set above forecast, has NCA exceeded NCO and thus been limited, as compared to when NCO is set below forecasts. When these factors are taken into account

and only the years when NCO exceeds forecasts are considered in error calculations, forecast errors are shown to be significantly reduced from even CNRC projections.

In order to ensure that the future accuracy of CNRC forecasts is as effective as they have been in the past, analysis of the model variables and the factors which impact the decisions of youth to enlist must be continually evaluated. To this end, particular attention should be paid to potential improvements in all model variables, but specifically, the advertising, relative pay, and veteran population variables. In addition, different model specifications, with respect to population subgroups, as well as the addition of a propensity variable should be further evaluated to improve model and forecast accuracy.

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V. ASSIGNMENT OF GOALING NUMBERS TO RECRUITING REGIONS AND DISTRICTS

A. REGIONAL COMMAND GOALING

CNRC is ultimately responsible to ensure that the proper quantity and quality of new recruits are attained each year to meet the Navy's overall manning mission. To this end, CNRC goals each of the four Regional commands. The Regional commands are then responsible to CNRC for achieving their fair share of the overall annual goaled recruiting mission. The Navy Recruiting Districts (NRDs) are, in turn goaled by and responsible to their Regional commands for achieving their assigned mission goals. As was mentioned when discussing the goaling model, the model's output is in the form of NRD forecasted net new contracts. While this information is used primarily to derive required goal shares for the recruiting Regions, it is also useful in that it enables CNRC to provide the Regional commands with recommended goal shares for each of its Recruiting Districts.

1. New Contract Objectives and Accessions

New Contract Objectives (NCO) and Accessions are assigned to the Regions by CNRC. Accession numbers are driven by N13 guidance provided to CNRC for the current year's recruiting mission. This guidance, "FY Enlisted Recruiting Goals and Policies," (Director, Military Personnel Plans and Policy Division (N13)) stipulates to CNRC the overall number of accession required for the upcoming fiscal year. In addition, it provides a breakdown of accession goals/guidelines by month and includes goals for males and females and for prior and non-prior service recruits. The goal shares generated by CNRC through the enlisted goaling model and other means (primarily past production and trend data) are applied to these accession numbers in order to generate accession goal shares for the Regions.

The NCO requirements are generated and approved by CNRC. These requirements are based in part on guidance provided by N13 with respect to the overall desired size of the DEP at the end of the current fiscal year. As discussed in Chapter II.B, there are a number of factors that determine the optimal size of the DEP for the upcoming year. Given the current size of the DEP, end of fiscal year DEP requirements,

and future years projected accessions, CNRC determines the optimal end-of-year DEP size. Once this determination is made, the number of new contracts required to meet the final desired DEP end-state can be derived. The goal shares generated by CNRC and applied to N13 accession requirements are then applied in the same manner to the newly generated new contract objectives. This results in essentially two sets of goals which are published and distributed to the Regions. This process was discussed in Chapter II and was outlined in Figure 4.

2. Regional Command Input

Once CNRC has calculated all preliminary Region goal shares, they are distributed to the Regions for input, comments, and early planning efforts for the upcoming recruiting year. At this point, the Regions are given a chance to evaluate CNRC's proposed goal share recommendations based on the factors they feel are critical in their particular regions. The Regions will not always agree as to the importance of some of the model's included variables. For example, they may place a higher weighting on past production, may be losing key recruiting assets (experienced recruiters), or may believe that economic factors (such as the unemployment rate) in their areas may adversely affect their ability to meet goal in the upcoming year. For all these reasons, and a host of others, Region Commanders may fight to change their recruiting goal shares.

The fact that CNRC allows the Regions the opportunity to comment on the recruiting goal shares prior to final approval and implementation does not necessarily mean the numbers will be changed. The process is essentially a zero-sum game. Reducing the goaled numbers of one region must result in an increase in the goals of another. This results in a give-and-take between Regions. For this reason, while there may be discussions between the Regions and CNRC concerning goal shares, according to N511, in the end the change in the number of goaled contracts and accessions is normally minimal, typically no more than a few hundred.

Once input from the Regions has been gathered, modification to goaling numbers is completed, and a consensus has been reached, goals are then forwarded to Commander, Navy Recruiting Command for approval. Once approved, goals are formally distributed to the Regions in the form of a written instruction, COMNAVCRUITCOMINST 3100.1.

This instruction provides both the required goals of the Regions, as well as the recommended goals for the NRDs.

B. NAVY RECRUITING DISTRICT (NRD) GOALING

The regional commands, once assigned NCO and accession goals by CNRC must then determine how those numbers will be further broken down and assigned to their respective Districts. As mentioned in Chapter II, the Regional commands are autonomous in that they are free to assign goals to their Districts as they see fit. CNRC provides recommended goals to each Region for its NRDs and while one or all may choose to simply follow the CNRC recommendations, none are required to do so. CNRC recommendations are not disregarded by any stretch of the imagination, however. Regardless of the method used by each of the four Regional commands, the CNRC numbers are closely evaluated. They are, if nothing else used as a sort of "sanity check" by the Regions, to ensure the goaling method being employed is providing accurate estimates for its NRDs.

Each of the Navy Recruiting Regions is operated as a separate command. It would follow then, that each has a slightly different way of determining and assigning goals within its own region. There are a number of reasons why this occurs. First, the leadership philosophies within each of the Regions will always be slightly different. While the ultimate goal of achieving recruiting success and meeting all assigned goals will rarely differ, the method of achieving these end results often do differ. Second, differing population characteristics and changing economic conditions across regions and over time can have a dramatic effect on a Region's ability to recruit. This can create differences among Regions as to the importance of varying recruiting factors. Differences in the importance placed on past production, recruiter productivity and economic conditions across NRDs can result in Regions assigning goals in very different manners. The discussion that follows, will describe the model/process utilized by Navy Recruiting Region West in determining the breakdown and assignment of Districts goals.

The method of assigning goals discussed in this section is based on one particular Region's methodology. It is only one example of what factors the Regions consider when assigning goals to their Districts. It should be noted that the process of establishing goals at the Regional level may or may not include the information and factors utilized by

CNRC in their establishment of goals. At the NRD level, the information becomes much more localized and disaggregated.

The information used by CNRC to establish goals for the Regions and NRDs is of a much broader and varied focus. As the process progresses down to the Regions, and ultimately to the NRDs, these lower level commands become much more aware of their local economic conditions and the factors they believe will ultimately have the greatest impact on contracting young men and women. Each Region and NRD will then focus on a limited number of specific factors they believe will most affect their areas. CNRC can simply not be aware of the relative importance that each Region and District will place on differing factors when determining goals in their areas. This is precisely why the Regions are allowed to set goals for their NRDs, outside of CNRC control, and NRDs are allowed to set goals for their zones and stations.

1. Regional Command Model

a. *Are They Really Needed?*

Considering CNRC publishes recommended goals for all NRDs, why then would the Regions concern themselves with additional goaling practices; why not simply utilize the CNRC provided goals? To answer this question, two different situations must be considered. These situations revolve around successful and not-so successful recruiting periods.

During difficult recruiting times, when achieving assigned goal is difficult, regional goaling models appear to have greater validity. Regional goaling is very different from the process utilized by CNRC. Many of the factors included in the CNRC model are simply not understood or deemed necessary by the Regions. The Regions are independent commands and the success or failure of those commands lay in the hands of its leadership. Most simply do not understand the econometric model that CNRC uses to determine goals. For this reason, many of the factors considered by CNRC, such as the unemployment rate, relative military/civilian pay, advertising spending, veteran population, and historical NCO are not necessarily considered by the Regions and NRDs. A possible reason for this is that many of these factors tend to vary similarly across NRDs within a Region, over time. The unemployment rate, for example is known to have a large impact on the recruiting of youth. The unemployment rate within a Region,

is likely to vary less than it will nationally. For example, a rising unemployment rate in NRD New York is likely to be accompanied by rising unemployment rates throughout the Northeast. While unemployment rates will vary across NRDs within a Region (in this case across the Northeast), the resulting impact of this rise is the unemployment rate is much more likely to be felt similarly across NRDs in the Northeast than it is across all NRDs nationally. Likewise, advertising spending and veteran population numbers remain relatively constant within Regions. The percentage of advertising dollars spent in a Region or the percentage of the overall veteran population living within a Region is not likely to change drastically from one year to the next. As a result, these factors are of less importance to Regions when attempting to determine what regional factors will most affect future recruiting in their areas. Instead, they rely much more heavily on past new contract attainment, attainment trends, and recruiting resources (primarily recruiters) within their Regions to assign goals. In this respect, the use of additional goaling methods at the Regional level, that capture only those factors the Regions deem the most important for "their" area of the country, seem to be useful. Regions are able to effectively operate using less cumbersome goaling methods, which are easier to understand, and that ultimately improves acceptance by those who it affects.

During successful recruiting times, when goals are being easily met, as they have been in recent years, there is less need for the Regional commands to run additional goaling models. In the end, after using in-house methods for assigning NRD goals, Regional goals do not vary significantly from those recommended by CNRC. During these successful recruiting times, particularly when goals are low, CNRC's goaling model forecasts production that exceeds N13 requirements. In these situations, when Regions and NRDs are essentially under-goaled, CNRC recommendations are likely to be adequate. Again, however, each Regional command wants to be responsible for their own success and failure and ultimately, they are in a much better position to assign and monitor goals.

b. Region West Model

The processes used by the four Regions to goal their NRDs differ. The purpose here was not to uncover how each of the four Regional commands conducted their goaling processes, nor was it to compare and contrast the different processes.

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Rather, the purpose was to gain a general understanding of how the Regions conduct the goaling process and to understand the differences that exist between the Regions and CNRC. This section is based on interviews with Region West goaling personnel, in particular Ms. Susan Gunder, which were used to evaluate Recruiting Region West's goaling model.

From a Regional perspective, although only a basic understanding exists as to how CNRC actually develops goal shares, the process is believed to be effective. CNRC's goaling and forecasting model is somewhat a mystery to those within the recruiting organization at the Regional and NRD level, who are detached from the inner-workings of Code N511 at CNRC (those who actually conduct model forecasting). Additionally, as mentioned above, CNRC's model contains a number of factors that are of little value to the Regions. Instead, the focus of the Regional model is much more localized and much more focused on factors that can be easily understood. These factors are recruiter numbers, male - HSDG populations, all-service accession data (ASAD), and New Contracts Attained (NCA).

These factors are easily quantified and are based on regional production data. The use of these factors eliminates the need to run a complex model, which would include variables that may have little predictive power and that would increase the time and effort required to do this forecasting. This keeps the model simple so that everyone involved in the goaling process (at the Region and the NRDs) can understand and interpret its output. This allows for effective and beneficial feedback that might otherwise not be possible.

The factors for the Region West model are broken down as follows:

(1) Production Recruiters: The number of production recruiters in each of the Districts within the Region is broken down by percentage of the total overall recruiters within the Region. These recruiter numbers are attained from internal Regional data.

(2) Male HSDG TSC I-IIIA and TSC IIIB Populations: This number represents the total male population within each of the NRDs. The percentage of the male population is then broken down by District, based on the total overall male

population figures for the Region. The data used to determine the male population percentages for each of the NRDs is provided by CNRC and is the same data used in the CNRC goaling and forecasting model.

(3) All-Service Accession Data (ASAD): This data is provided by the Defense Management Data Center (DMDC) and provides a breakdown of the total number of recruits who were enlisted into all branches of the armed forces over the previous three fiscal years. Percentages for each of the Districts are then generated based on the district's production, as compared to the overall Region's production.

(4) New Contracts Attained (NCA): The new contracts attained data is also obtained from in-house information and represents the number of new contracts produced over the previous three recruiting periods. A percentage is then calculated for each of the NRDs, based on their total NCA as compared to the total NCA for the Region over the same time period.

After calculating percent of area shares for each of the factors listed above, relative weightings are then applied to each of the four factors. Doing this, results in a weighted goal percentage for each of the factors, by NRD. Once this has been completed for each of the four factors, the weighted goal percentages by NRD are summed to arrive at a total weighted average goal share per NRDs, within the Region. The overall goal share for the Region, provided by CNRC, is then multiplied by each weighted average goal share percentage to arrive at individual goal shares for each of the Region's NRDs. Table 3 provides an example of how Region West's goaling model, using a 25% weighting for all factors, is used to generate individual goal shares for each of its eight NRDs.

In Table 3, the first variable considered is recruiters. Here, the number of recruiters in each NRD is divided by the total number of recruiters in the Region. The resulting number is the percent of Regional recruiters, by NRD. For example, in NRD Phoenix, the number of recruiters (78), divided by the total number of recruiters in Region West (1,075), which results in a percent (%) area RECR for NRD Phoenix of 7.26%. The % area RECR number and the REC WT Factor (in this example, 25% weighting for all factors) is then multiplied to arrive at the Phoenix Recruiter (R) WTG %

of 1.81%. A similar process follows for male HSDG TSC I-IIIA and TSC 3B population, All-Service Accession Data, and New Contracts Attained data.

As shown in Table 3, the weighted percentages for each of the four variables (in bold type) are then summed to arrive at the total weighted goal share (also in bold type) for each of the NRDs. In the NRD Phoenix example, the results are as follows: recruiter WTG % (1.81) + male I-IIIA and 3B pop % (2.11) + ASAD WTG % (1.73) + NCA WTG % (1.77) = total weighted goal share (7.43%). The total weighted goal share percentages are then multiplied against the total assigned Regional goal share in order to arrive at individual NRD goal shares. Again, using NRD Phoenix as an example, 11,100 contracts (Region West total goal share) is multiplied by 7.43% (NRD Phoenix weighted goal share), to arrive at NRD Phoenix's annual goal share of 824.2 contracts. Projected PPR calculations for each NRD are also calculated. In the case of NRD Phoenix, this requires dividing 824.2 contracts by (78 recruiters X 12 months), to arrive at a projected PPR for the year of 0.88.

Arriving at acceptable goal shares, however, is much more difficult than simply plugging in a 25 percent weighting for each of the four factors. While this could certainly provide an acceptable solution, numerous trial runs are performed using a number of model configurations, using varying percentages. In fact, many trial runs will also be conducted by omitting one or more of the variables. As a result of these many trial runs, very different goal share results will be generated. Arriving at acceptable goal shares involves not only varying the weightings, but also input from a number of people within the Region.

Each year, senior leadership from each of the NRDs meet with Regional personnel to provide input as to how they feel each of the factors should be weighted. These inputs come from very detailed perspectives within each NRD as to how each of the factors affect their performance. One NRD may be rotating a significant number of its senior recruiters and therefore desire a lower weighting for the recruiter factor. Another may have experienced an increase in competing, other-service recruiters, and feel recruiting will become more difficult as a result. This may lead an NRD to desire a lower weighting of the ASAD factor. Finally, one or more Districts may have had

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Table 5.   Region West Goaling Model (assuming a 25% weighting for all factors)

TOTAL RECRUITERS   1075
TOTAL REGION NCO   11100

	# REC ONBD	% AREA RECR.	REC WT FACT	R WTD %	Male HSDG 1-3A and hsdg 3b pop POP	% AREA	MKT WT FACT	(M)WTD%
PHOENIX	78	7.26%	25.00%	**1.81%**	54965	8.44%	25.00%	**2.11%**
ALBUQUERQUE	106	9.86%	25.00%	**2.47%**	63439	9.74%	25.00%	**2.44%**
LOS ANGELES	185	17.21%	25.00%	**4.30%**	87799	13.48%	25.00%	**3.37%**
PORTLAND	95	8.84%	25.00%	**2.21%**	86227	13.24%	25.00%	**3.31%**
SAN FRANCISCO	181	16.84%	25.00%	**4.21%**	117547	18.05%	25.00%	**4.51%**
SEATTLE	91	8.47%	25.00%	**2.12%**	87508	13.44%	25.00%	**3.36%**
SAN DIEGO	188	17.49%	25.00%	**4.37%**	90668	13.92%	25.00%	**3.48%**
SAN ANTONIO	151	14.05%	25.00%	**3.51%**	63043	9.68%	25.00%	**2.42%**
REGION 0	1075	100.0%			651196	100.0%		

	ASAD	% AREA	ASAD WT FACT	(ASAD) WTD%	NCA	% AREA	NCA WT FACT	(NCA) WTD%
PHOENIX	12696	0.0693	25.00%	**1.73%**	3738	0.0708	25.00%	**1.77%**
ALBUQUERQUE	18097	0.0987	25.00%	**2.47%**	4937	0.0935	25.00%	**2.34%**
LOS ANGELES	25744	0.1404	25.00%	**3.51%**	8968	0.1698	25.00%	**4.25%**
PORTLAND	19802	0.1080	25.00%	**2.70%**	5244	0.0993	25.00%	**2.48%**
SAN FRANCISCO	31169	0.1700	25.00%	**4.25%**	8672	0.1642	25.00%	**4.11%**
SEATTLE	21966	0.1198	25.00%	**3.00%**	5565	0.1054	25.00%	**2.63%**
SAN DIEGO	26324	0.1436	25.00%	**3.59%**	8861	0.1678	25.00%	**4.20%**
SAN ANTONIO	27512	0.1501	25.00%	**3.75%**	6821	0.1292	25.00%	**3.23%**
REGION	183310	1.0000			52806	1.0000		

	WTD GOAL SHARE	New Annual Goal	PPR
PHOENIX	**7.43%**	824.2	0.88
ALBUQUERQUE	**9.71%**	1077.4	0.85
LOS ANGELES	**15.43%**	1712.7	0.77
PORTLAND	**10.70%**	1188.0	1.04
SAN FRANCISCO	**17.08%**	1895.7	0.87
SEATTLE	**11.11%**	1232.8	1.13
SAN DIEGO	**15.64%**	1735.8	0.77
SAN ANTONIO	**12.91%**	1433.4	0.79
REGION	**1.0**	11100.0	0.86

Source: "Navy Recruiting Region West 2005 Goaling Model"

tremendous recruiting success in recent years, while others within the Region may have struggled and even fallen short of their mission. This might result in these NRDs pushing for higher or lower weightings on the NCA factor, based on how well they feel they can perform in the upcoming year.

Once all inputs are received from the individual NRDs, the Regional Command must decide on what factors will be utilized and what the appropriate weightings will be for each of the included factors. As was mentioned in Section B of this Chapter, while all NRD considerations are taken into account, as well as all inputs from Regional leadership, the recommendations provided to the Regions by CNRC for each of the NRDs go a long way in determining what the final goal shares will look like. While the Regions may not consider all the data that CNRC uses extremely relevant to their particular area, and while the CNRC model is not specifically tailored to meet all the individual concerns for each of the four Regions, the Regions are well aware of the predictive capability and accuracy of the CNRC model. For these reasons, regionally assigned NRD goals will generally not vary significantly from CNRC's recommendations.

Finally, there is one additional factor which the Regions consider extremely important in the establishment of NRD goals--PPR. As discussed in Chapter II.C.4, the projected PPR for an area, whether it is a NRD, Region, or the Nation can be calculated prior to the current period. As a result, the PPR for any proposed NRD goals is calculated based on projected recruiter resources within each of the NRDs for the upcoming year. While there can be some adjustment of the PPR numbers, based on the rotation of recruiter assets and other factors, there seems to be a reluctance, at least on the part of the Regions, to stray too far from the previous period's PPR. For example, the overall PPR for the Region will, to a great degree, be driven by the goal it is assigned. The same is true for NRDs. The Regions are able to control the PPR in a NRD by the goal it assigns. Thus, while the PPR for a Region and its NRDs is greatly driven by the overall CNRC mission for the upcoming year, each Region has the ability to control the relative PPR amongst its Districts. Therefore, NRDs that have traditionally produced higher PPRs (at least in recent years) within the Region will, in most cases, be assigned

current goals which require achieving a higher PPR than other NRDs, in order to meet goal.

While this approach may have some merit, the problem is that very close attention must be paid to the leadership and tactics employed by the NRDs. The situation that results is one that relies heavily on past production data. Following this approach, it is quite conceivable that an NRD that has performed well under strong leadership in recent years will be over-goaled in the future. This could happen, for example, if there is excessive turnover of recruiters or leadership. Likewise, it is quite possible that an under-performing NRD in years past will be under-goaled in the future, for example, when stronger leadership and low recruiter turnover might be capable of increased production. The difficulty in dealing with this problem is that it is not readily apparent during times of successful recruiting. The result is a masking of any potential problems that may exist. While this does not seem to be a major concern for the Regions, as it is relatively easy for them to access recruits from the stronger performing NRDs to make up for shortfalls among the underperformers, CNRC does make an attempt to minimize this potential problem. CNRC's model typically uses a minimum of five years worth of quarterly data, in an attempt to capture the NRD performance under at least three different Commanding Officer/Executive Officer combinations. According to Mr. Rudy Sladyk at N511, "the idea is that the leadership abilities across NRDs and over time will differ. By utilizing data that covers a longer past period, the impact of leadership quality on NRD performance is minimized." (Sladyk, 2004) In limiting potential problems at the Regional level, with respect to the reliance on past production and PPR, it is vital that the Regions fully understand differences in locally generated numbers versus those CNRC recommends for their NRDs. This will likely minimize the potential negative effect of blindly stressing past production measures.

2. Navy Recruiting District (NRD) Goaling

The focus of this thesis was to examine the process by which CNRC developed and implemented goal shares for the Regions and assessment of goals to NRDs. For that reason, the methods utilized by the NRDs to determine goals for their recruiting Zones and Stations will not be discussed in detail. It is safe to say, however, that the methods

employed by the Districts greatly resemble those that are used at the Region level. (NRD San Francisco interview, January 2005)

C. NEW CONRACT OBJECTIVE (NCO) AND ACCESIONS; WHERE'S THE FOCUS?

The assigning of NCO and accession goals to the Regions and Districts has thus far been the focus. But, how are these numbers viewed at various levels within the recruiting organization and which number is viewed as the most important? To answer these questions we must look at the importance of each of these goals at each level of the recruiting organization and the incentives that currently exist.

The simple answer to the questions posed above is that both NCO and Accessions are important. Accessions are critical to meeting the required manning levels of the Navy today, as well as providing a foundation for future leadership that will carry the Navy into the future. NCO can be viewed as equally important in that it provides the "pool" from which future enlisted recruits are obtained. The importance of accessions and NCO is not necessarily seen as equal throughout the recruiting organization, however.

1. Recruiting Organization Leadership

For Military Personnel Plans and Policy (N13) the focus is primarily on recruit accessions. While N13 does stipulate the desired size of the DEP (which is driven, in part, by NCO), the only requirement N13 places on CNRC is that of accessions. Based on projected manning levels throughout the fiscal year, N13 will regularly update the Accession Implementation Plan, and thus the accession requirements placed on CNRC. The goal of setting NCO to meet N13 guidelines and future accession requirements is left primarily in the hands of CNRC.

For CNRC, accessions and NCO appear to be viewed as equally important. While accessions are the overriding goal to meet current recruiting mission, the importance of NCO on meeting future mission is not lost. What tends to separate the two is the fact that missed accession goals are essentially lost. Recruit training and follow-on pipeline training seats are established well in advance based on projected accessions. Should the Navy fail to meet its accession mission in a given month, those seats are effectively lost. In the case of NCO, a missed goal in a given month is not as critical, particularly at the beginning of the fiscal year, as these missed goals can simply be spread

out and made up in the months ahead. This is possible due to the fact that NCO recruits are placed into the DEP, and may not ship for up to 12 months. It is much more difficult to make up for missed accessions in out-months, as recruit training and follow-on schools are scheduled well in advance and may not be able to accommodate the changes.

The same thoughts persist at the Region and District level commands. Every effort is made to meet both accession and NCO goals. However, at the end of the day (in reality, the end of the month), accessions become the top priority. In this respect, the goals of the Regional and District leadership are quite similar.

Table 4 highlights the point of accessions taking priority over new contracts. Table 4 provides the Navy's NCO nationally for the years 1994 to 2003 as well as the NCA achieved over the same time period. During the ten fiscal years, from 1994 to 2003, the Navy was able to meet its overall annual accession goals in all but one year (1998), which was a period when all services experienced significant recruiting difficulty. Over this same time period, however, New Contracts Attained (NCA) exceeded New Contract Objective (NCO) only twice (2002 and 2003). Interestingly, in eight of the ten years, and six of the eight years in which the Navy failed to meet NCO, CNRC forecasted new contracts were actually higher than NCA.

Table 6.   Goaled New Contact Objective vs. Actual New Contracts Attained

FY	NCO	NCA	CNRC Forecast
1994	55,940	50,242	50,013
1995	57,222	51,229	52,872
1996	54,280	50,659	53,466
1997	47,300	44,538	48,559
1998	54,271	44,458	47,528
1999	58,077	53,504	48,273
2000	61,000	56,469	56,971
2001	59,000	55,098	56,253
2002	52,190	53,080	55,900
2003	40,692	41,642	47,800

Source: Future Operations Analysis Group, Plans, Analysis and Research Department (N5), Navy Recruiting Command, email dated 4 March 2005

2. Production Recruiters

The Navy's current incentive system, which is designed to motivate recruiter performance, does not seem to be completely aligned with the goal of obtaining accessions.   As discussed in Chapter II.C.4, while recruiters are assigned NCO and accession goals, they are rewarded primarily on the contracts they write.   While additional points for accessions are included in the points program, quite often the points a recruiter will eventually receive for a contract becoming an accession, will not be realized in the current production (and awards) cycle.   This is because a significant number of the recruits contracted during the current recruiting cycle will not become accessions until the following recruiting cycle (due to spending up to 12 months in the DEP).

There is little doubt that the majority of recruiters make every effort to meet both NCO and accession goals. However, the present incentive system is designed to motive contract production. For recruiters who are purely driven by the desire to achieve a particular award level, the focus may revolve solely around contract production. This desire to drive up contract numbers to boost point totals to gain recognition and awards, while seemingly impressive in the current recruiting period, can negatively impact future recruiting efforts if the quality of these contracted recruits is not closely monitored. The potential exists for a significant portion of the year-end DEP pool to consist of less than desirable, low-quality recruit candidates, contracted by recruiters driven to receive an award and not necessarily by the recruit's likelihood of future accession or potential for completing the first-term of enlistment.

The possible existence of such incentives and the negative outcome are shown in Figure 9. This chart displays the attrition exhibited by new recruits at Recruit Training Command (RTC) over approximately a three and a half year period. From this chart, it is evident that there is a general downward trend in RTC attrition. While this is certainly a positive trend, unfortunately it is not the only trend present.   Each year there is a significantly higher attrition rate at RTC between November and April than during the months of May through October. It is certainly no coincidence that the months of May through October represent the peak recruiting months of the fiscal year when the majority of those who have recently graduated high school enter recruit training. While these

recent high school graduates represent a large portion of the TSC I-IIIA (high quality) recruits the Navy accesses each year, and we expect them to have the overall lowest attrition rates throughout their Navy careers, this is not the only reason for the attrition disparity.

Figure 10.   Recruit Training Command (RTC) Attrition (Oct 2000 to June 2004)
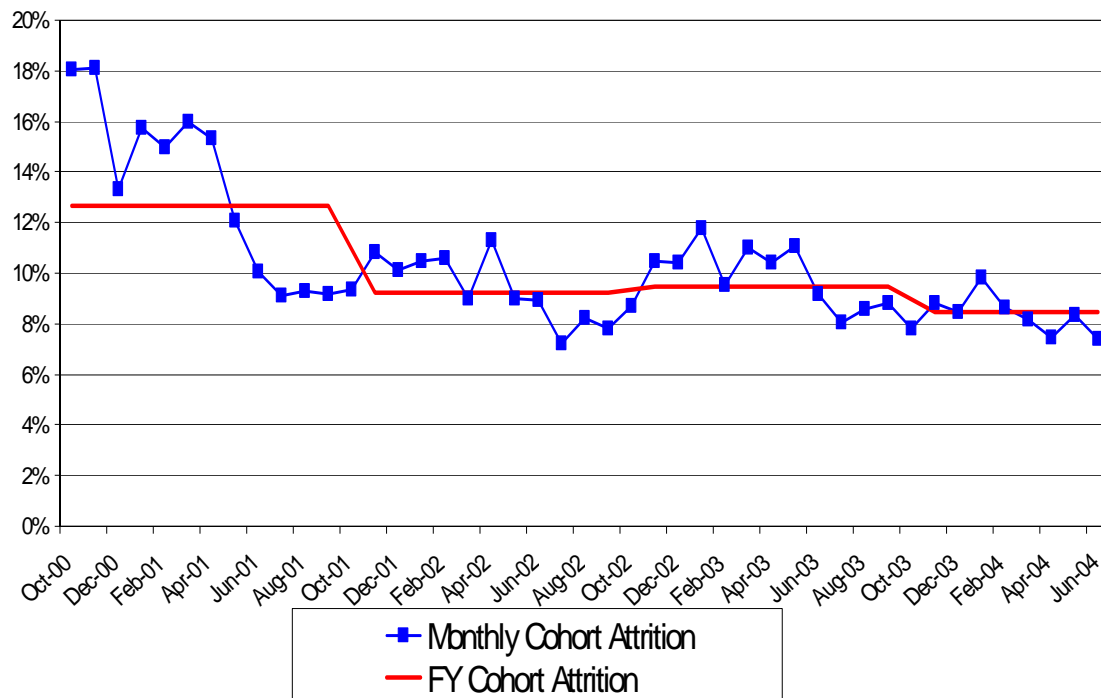
Source: From *Quarterly Recruiting Brief to CNP/CNRF*, CNRC Briefing, October 2004.

November through April represent the beginning of the new fiscal year, as well as a new recruiting year and awards cycle. Nearly all of the recruits the Navy will access during these months will have been contracted during the previous recruiting cycle. It is not surprising then, that the quality of recruits the Navy accesses during these months are of a lower average quality. It is during this time that the majority of the less than desirable recruits, who may have been contracted primarily for the purpose of improving

Enlisted Recruiter Incentive System (ERIS) point totals, will access. This period of the year also represents some of the highest DEP attrition rates. Also, it is noteworthy that attrition, which would otherwise count against a production recruiters ERIS point total, is of little concern to a recruiter who is due to rotate and will not finish the recruiting production year

The focus of a large majority within the recruiting organization, particularly at higher levels of leadership, rests with accessions (today's mission). Interestingly, however, due to the very incentives designed to motivate their performance, the focus of those individuals directly tasked with making the recruiting mission happen, do not necessarily share this same focus. "Today's mission" for recruiters revolves around contracts. For this reason, it is believed that the overall quality of accessed Navy recruits is lower than it could be.

D.   CHAPTER SUMMARY

N13 begins the goaling process when it assigns accession goals to CNRC in the annul assignment of Enlisted Recruiting Goals and Policies. CNRC, using these outlined requirements, will run its enlisted goaling and forecasting model to forecast the number of recruits the Navy should be able to access, given current recruiting environment conditions. Based on the results of the goaling and forecasting model, as well as other factors, such as desired DEP endstrength, projected recruiting resources, and forecasted accession goals for out-years, CNRC will set a goal for NCO. Using model results and additional means, such as past production and recruiting trends, CNRC will establish goal share percentages, which is will use in an attempt to fairly and effectively derive recruiting goals for recruiting Regions and Districts. Once these goal shares are determined, they are applied to NCO and accession requirements to establish actual goals, which are distributed to the Regions for comment and input.

Following Region review and comments, CNRC establishes and approves recruiting goals for each of the Regional commands. In addition they provide recommended goals for each of the NRDs. The Regions then begin the task of assigning Regional goals to their NRDs, based on Regional objectives. These objectives include primarily, recruiter numbers, male - HSDG populations, All-Service Accession Data (ASAD), and New Contracts Attained (NCA). Regions will also tend to rely of past

production and PPR rather heavily in the generation of NRD goals, but will not generally stray too far from CNRC recommended goals. As CNRC does with Regional goals, the Regions will seek input from each of their NRDs, prior to the establishment and distribution of final goals.

New contracts and accessions are both considered important numbers in the recruiting world. However, the importance of these numbers varies within the recruiting organization. At higher leadership levels, including N13, CNRC, Regions, and Districts, the primary focus will always fall to what is the most pressing need. That need is to meet accessions. The Navy has a large infrastructure in place to train new recruits for their ultimate assignment to the fleet. Failing to achieve accession goals, resulting in lost training seat can be very costly and very difficult to recover from. The importance in accessions is shown by the fact that in the previous 10 years, the Navy has only failed to meet accession goals twice, while it has failed to achieve NCO, eight times.

The focus of production recruiters is on contracts, especially for those who are in competition for annual recruiting awards. The current awards system (ERIS) seems to drive this behavior, which is ultimately not good for recruiting. It very likely results in contracting less than desirable recruits and placing them into the DEP with accession dates that will not arrive until the next recruiting cycle. As a result, DEP attrition during the early months of the fiscal year, as well as RTC attrition, particularly during the months of October through April, is significantly higher than it is during the remainder of the year.

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VI. CONCLUSIONS AND RECOMENDATIONS

A. CONCLUSIONS

The overriding purpose behind CNRC's forecasting of enlisted new contract production is, "the fair and impartial distribution of new contract goals to each region." (CNRC Brief, 28 Apr 2004) CNRC uses forecasts, generated in part by the enlisted goaling and forecasting model, to generate goal shares. These goal shares are then used to assign Regional goals and NRD recommended goals. CNRC assigns goals for accession and NCO; however, only the NCO goal is generated by CNRC. The accuracy of these forecasts is determined by measuring the difference between forecasts and NCA. Through the years, forecasts have proven to be quite accurate. This accuracy can be greatly affected by the assignment of NCO, depending on whether it is greater than or less than the forecast. Removing data for years in which recruiting has been restricted by the assignment of NCO reveals that the accuracy of the CNRC forecasts has actually been much more impressive than previously reported.

The most accurate CNRC forecasts are shown to occur when NCO is set above the actual yearly forecast. In each of these instances (seven times since 1994), NCA has fallen short of NCO, although accession requirements have typically still been reached. During these situations, drawing upon a healthy DEP can provide the additional recruits needed to insure the most important goal of all (accessions) is reached. Too large a DEP can present its own difficulties, however, in additional recruiter time being spent managing the DEP and less time being spent actually seeking new contracts. The end result of an excessively large DEP is likely a lower percentage of TSC I-IIIA recruits than could otherwise have been achieved.

The enlisted goaling and forecasting model uses a number of economic, population and recruiting resource variables to predict new contracts, by NRD. Once goals have been assigned to Regions, the Regions are then responsible for assigning goal shares to their Districts. The Regions rely on much simpler measures when determining NRD goal shares. These measures include a heavy reliance (by both Regions and NRDs) on past production and PPR data. Past production and PPR can be useful in determining

goals. They can also lead to the over- and under-assigning of goals if relied upon too heavily. Recruiting success likely masks any over- or under-assigning of goals, as Regions and NRDs will draw from top-performing areas to make up for under-performing ones. During difficult recruiting periods, when many areas are struggling, these flaws in goaling will be magnified and possibly result in overall accessions and NCA being lower than what it otherwise should have been.

PPR is not a realistic measure of recruiter performance and is not an effective measure to use for goaling areas. During successful recruiting periods, PPR for a given area can essentially be calculated prior to the beginning of the period. Additionally, the recruitment of increased percentages of high-quality recruits, increasing numbers of recruits with college credits, and increasing numbers of female recruits is not captured by the PPR measure. Although PPR numbers have consistently declined over the years, in reality, the effort and effectiveness of recruiters may have actually increased. This is contrary to what the measure leads one to believe.

While the goaling model has proven to be quite effective, more precise data and measures which more accurately capture the intended measures of the included model variables could improve the model's predictive accuracy. Improving model data, however, will likely prove costly and may not be justified if only minimal improvements in the model's output are likely. Overall model performance will change over time, as the included variables themselves change. Factors which are not currently included in the model, such as propensity and family income, and others not yet quantified, may one day prove vital to the model's success.

Accession and NCO goals differ in importance, depending on the level within the recruiting organization that is being evaluated. At CNRC, Regional commands and leadership levels within NRDs, accessions are the primary concern. Production recruiters, on the other hand are much more focused on contract production. The primary reason for this difference is the incentive system, ERIS, which is designed to motivate contract performance. A re-evaluation of the recruiter incentive system, with a possible shortening of the recruiting awards cycle would likely lead to decreased DEP and RTC attrition rates, as well as increased percentages of TSC I-IIIA recruits.

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Combined with long DEP times, which place newly contracted recruits in out-months falling in subsequent recruiting cycles, the system is potentially and rather easily abused by some who are motivated only by current award cycle incentives. As a result, a number of recruits, who would otherwise not be viewed as likely to access or complete their enlistments, are contracted. The results are increased DEP attrition rates during the early months of the recruiting cycle, as well as above-average Recruit Training Command attrition rates during the time period in which these suspect contracts would normally access.

Youth attitudes and the changing factors which affect youth propensity to enlist should be continually evaluated. Additionally, propensity as a factor in determining goal share recommendations should continue to be researched. Significant differences in the propensity of youth exist across the country. Capturing the effect of propensity would likely improve goaling model performance. Possible areas for further research on propensity measures for youth that could be considered for use in the model include: college entrance rates for high school seniors, youth views of the military's role in current and future years, and the views of parents and educators who influence society's youth.

Finally, current (2005) recruiting times seem eerily similar to those of the early 1990's. Navy manning is being drastically reduced, the economy is on the rebound with falling unemployment rates, and the Navy is cutting production recruiter numbers. A similar recipe for recruiting disaster appears to be presenting itself today as it did approximately 10 years ago. Due diligence should be given to the reduction of recruiting assets and the significantly negative impact that an improved economy with falling unemployment rates can have on recruiting.

B.   RECOMMENDATIONS

Based on the analysis and discussions presented throughout this thesis, the following recommendations are provided:

(1)   Although CNRC's goaling and forecasting model is probably more accurate than they give themselves credit for, continued efforts should be made to improve its performance. Youth attitudes, as well as the factors currently captured in the

goaling model are in continual motion. Continuous evaluation of these factors and continuing efforts to improve the data supplied for current variables (particularly relative pay and regional advertising spending), will insure that the model is kept up-to-date and providing the best possible forecasts. Research into developing a propensity measure that can be incorporated into the goaling and forecasting model should be conducted. The trend of decreasing propensity among youth for military service is unlikely to change any time soon. A direct propensity variable added to the model would likely enhance the goaling model's predictive capability in determining forecasts.

(2)   Past production and PPR should be viewed with caution when used for goaling by Regions and Districts. Regions should ensure that goals which differ significantly from those recommended by CNRC are reasonably justified, especially during difficult recruiting times.

(3)   PPR is an unreliable measure of recruiter performance. Additional research into developing a more reliable measure that better captures the true efforts of recruiters in a dynamic recruiting environment should be conducted. Such a measure would likely be a valuable aid in better allocating recruiting resources, as well as improving the performance of goaling methods throughout the recruiting organization.

(4)   There is a disparity is the way accessions and contracts are viewed, with regards to their importance, at various levels within the recruiting organization. The recruiter incentive system should be re-evaluated to determine if modifications can be made to realign the overall goals of leadership and production recruiters. Shortening the recruiting awards cycle appears to be a reasonable first step to system improvement, and one that can be accomplished at minimal cost.

(5)   Reduced DEP percentages would provide additional time for recruiters to actually recruit. A reduction in the size of the DEP, with a subsequent increase in the TSC I-IIIA recruit percentages, would likely improve the quality of the force, to include reduced attrition rates and decreased training and recruiting dollars. Additional research should be conducted into determining the ideal DEP size and the feasibility of implementing these proposed changes.

(6)   Since recruiting has been relatively easy for the Navy in recent years, it is recommended that the Navy push the envelope with respect to recruiting TSC I-IIIA recruits.   Pushing TSC I-IIIA requirements towards 75 percent does not seem unattainable.   The Navy will not know if it can achieve this goal unless it makes the effort.   Restructured incentives, with appropriate awards for success (no negative impact for failure) to reach enhanced goals, would likely significantly improve the overall quality of contracted recruits.

(7)   Reductions in the size of the recruiting force should be limited.   As has typically happened in the past, good recruiting times are eventually followed by difficult recruiting years.   Maintaining the recruiting force is critical in the wake of an improving economy with falling unemployment rates and decreased youth propensity, which will undoubtedly create a more difficult recruiting environment in the months and years ahead.

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